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Electrical Manufacturing Reports.

THE review of electrical industrial affairs by the chairman of the B.E.A.M.A., published in our last issue, has been immediately followed by several interesting statements by chairmen of electrical manufacturing companies, which are summarised in our "City Notes" this week.

The statement made by Sir Philip Nash at the annual meeting of the Metropolitan-Vickers Electrical Co., Ltd., showed that during 1925 that company produced a record output, the tonnage of orders completed representing an increase of 5.2 per cent. over 1924. Excluding the supply business, there was a decrease of 3 per cent. in home orders, but this was more than compensated for by an increase of 4.68 per cent. in export orders. The year 1926 began with a slightly smaller volume of work in hand, but since then the booking of new business has proceeded satisfactorily. The company suffered from the same experience as some other concerns in respect of the falling off in orders for heavy electrical plant for the Home market, partly because of the unsettling effect of a legislative atmosphere. Sir Philip thinks that such manufacturing concerns must be prepared for progress to be arrested for the time being and for a further falling off in Home sales until the Electricity Supply Bill has made headway in Parliament. He said that it rested with Parliament to convert the Bill into an Act which would not restrict our operations, but would assist the power supply side of the industry to go straight ahead.

The export business tonnage booked by the company during 1925 constituted a record, and this high-water mark will be maintained during 1926, but once again this is only possible by working with the barest margin of profit. Though competition grows in severity, the works must be occupied so as to give employment and to absorb the heavy standing charges. Another point in regard to the company's export trade is its bearing on future developments at home. The largest units in practically every line of Met.-Vickers manufactures go abroad, and technical developments which do much to keep the concern in the forefront of the industry therefore "arise almost entirely from the needs of

the export market." In this way operations for export are placing the company in a position to tackle large contemplated developments at home which may ensue from the electrical legislation now before the nation. This is also the case in respect of railway electrification. The bulk of the traction work carried out by British manufacturers during the last three years has been for abroad; this furnishes both experience and reputation, but let us hope that the Home railways will soon be substantial customers in this department, though it seems to require little short of an earthquake to move them from their rut. Sir Philip Nash and Col. R. K. Morcom have both in recent speeches directed attention to the important fact that wherever railway electrification has been adopted, the results have more than justified the calculations upon which the schemes were based. The M.V. company has established works in Sydney and Melbourne for certain electrical manufacturing purposes in view of the Australian Government's declared policy of giving preference to local production, and it reports that the operations carried on there have resulted in a substantial profit during each year of the existence of the works.

Mr. A. F. Berry, in his speech to shareholders in the British Electric Transformer Co., Ltd., was able to report a very substantial improvement in trade and in profit earned, although the year did not yield a full share of work. He said it was wrong to assume that because electricity supply undertakings were prospering, manufacturers of electrical plant and machinery were also doing so; manufacturers, unlike electricity supply authorities, had no monopoly; indeed, they had to meet stern competition, and to some extent their general charges had to be borne by export work. He expressed a hope that less would be heard this year of British capital being expended upon foreign electrical equipment. Our factories greatly needed the work. The nature of one side of the company's business led him to mention the increasing popularity of domestic electrical appliances. We welcome every speech that is delivered stressing the immense importance of attention being concentrated upon the expansion of the domestic load. Mr. R. P. Sloan, the president of E.D.A., emphasised its value especially at a time of industrial depression such as has been experienced in his own area, and we hope that the current year will witness great progress in many areas whether there is or is not the incentive of industrial depression. As Mr. Berry mentioned, the growing domestic demand has undoubtedly begun to stimulate orders for plant, machinery, cable and switchgear. Domestic electrical development, in which we have made, comparatively speaking, such small progress, is one of the great hopes of the electrical manufacturing industry. It is unquestionably true that the Electrical Development Association has a grand work to do, especially at a time when the public mind is fixed on electricity. With Mr. Sloan as its president we believe Mr. Beauchamp and his staff will not be discouraged, but will be able to press straight forward.

The exceptionally improved results recorded by the British Insulated Cables, Ltd., and mentioned in the annual speech by Mr. James Taylor, were partly due to the completion of work under some large contracts which have been occupying attention for several years, but they were also attributable to the benefit of lower manufacturing costs owing to the large sums spent in recent years upon improving and extending the factories, and to the fact that the year yielded a record output. It is noteworthy that £300,000 was expended on works extensions and equipment during the year. Mention was made by Mr. Taylor of the bonus scheme under which the staff is rewarded according to the results achieved. He attributed the company's success largely to the arrangement under which some of the workers were paid partly by fixed wages and partly by bonus on output or work done, and whereby all the permanent staff were paid partly by fixed salary and partly by a bonus, the amount of the latter depending upon the dividend paid to the shareholders from year to year. The scheme has undergone readjustment consequent upon the bonus share distributions, but what has been done has proved it to be advantageous to the shareholders generally to give every member of the staff a personal incentive to produce the best results.

The Government and the Coal Commission.

THE decision of the Government to adopt the Report of the Coal Commission and to institute the legislative measures necessary to give its recommendations effect is of direct interest to the electrical industry in several important respects. Fortunately there is a condition first to be fulfilled by those engaged in the coal mining industry—namely, that they also shall agree to accept the report and to carry on the industry in accordance therewith—and as it will take some time to arrive at that stage, the matter is not so urgent as it might otherwise appear.

The list of recommendations that would require action on the part of the Government, which was circulated after the Prime Minister had announced the decision of the Cabinet last week, contains some rather startling items, such as the compulsory amalgamation of mining properties, the State purchase of the mineral royalties, the granting of powers for local authorities to engage in the retail sale of coal—municipal trading with a vengeance!—and obligatory profit-sharing schemes; but those which more immediately concern the electrical industry are the proposals to assist the investigation of processes for the low-temperature carbonisation of coal, to establish a National Fuel and Power Council, and to extend the provision for research by the industry, with the support of the State.

These three propositions are more or less interdependent, and are so treated in the Summary of Findings and Recommendations at the end of the Report. The Commission contemplates "a closer connection of mining with the allied industries," the latter comprising gas, electricity, smokeless fuel, oil, chemical products, blast furnaces, and coke ovens, and suggests that "the development of electrical supply under the new proposals of the Government should be closely co-ordinated with the generation of electricity at the mines." This, it will be seen, is an exceedingly comprehensive and far-reaching conception, from which the imagination can conjure up fantastic dreams. Whilst the development of an efficient process of low-temperature carbonisation would unquestionably confer immense benefits upon the country, by the production of smokeless fuel, and of mineral oil in substitution for that which at present we have to import in large and increasing quantities; and whilst these processes inevitably involve the evolution of gas suitable for heating purposes and for the generation of electricity, we most certainly are not prepared to support their association with the coal mining industry in any way whatever. The extraction of coal is one thing—its utilisation is a totally different matter. The idea underlying this proposal, like that put forward by the Miners' Federation, is to bolster up the coal mining industry at the expense of other industries—to subsidise it in kind instead of cash—and we will have none of it. The mining industry must stand upon its own feet.

The establishment of a National Fuel and Power Board, which is an inherent part of the scheme, would not merely add yet another to the already too numerous controlling authorities and Government departments—it would undoubtedly tend to subordinate the electrical to the coal mining industry and impose new burdens upon the long-suffering shoulders of the electricity consumer. All these proposals lead in one common direction—towards the ultimate nationalisation of coal mining and electricity supply, a consummation which we believe would be disastrous to the efficiency and economy of both industries. We trust that our readers will give serious consideration to the dangers which they involve, and will resist their accomplishment by every legitimate means.

Industrial Relations.

For many years past the question of the relations between employers and their employés has been recognised as one of the most potent factors in industry. Thus the Committee on Industry and Trade was well advised to make industrial relations the basis of its second report. This report deals with a vast amount of information regarding wages, hours, and conditions in industry both national and international, and the review of the document which appears elsewhere in this issue does not pretend to be anything more than a guide to its contents. The Committee merely places on record the facts which it has elicited from evidence given before it, and from the study of foreign statistics, and leaves those concerned to draw their own inferences and formulate schemes in the light of the data thus gained.

In studying the latter-day phenomenon of higher wages being received by unskilled labour in "sheltered" industries than by skilled men in the exporting branches, the Committee adopts a non-committal attitude. In view of the complexity of the subject, involving the reconsideration of our position as an exporting nation, the Committee was no doubt wise in refraining from attempts to suggest a remedy. Another important matter studied is the comparative purchasing power of wages in this country and foreign states. This brings out the favourable situation of the North American continent, no less than the poor conditions prevalent in a number of Continental countries.

Upon reaching the main subject of the report, the Committee commends the British system of negotiation and voluntary settlements in industrial disputes, contrasting it with the attempts which have been made in Australia and elsewhere to enforce settlements by legislation. We agree with the implied view of the Committee that attempts to force either employers or workers to adopt any course by legal measures are foredoomed to failure, and we would add that endeavours of either party to impose conditions upon the other by economic measures (*i.e.*, strikes or lock-outs) are just as futile.

If any conclusions are to be drawn from the report, they are these: That the Whitley system, within the limits imposed by external economic conditions, has justified its existence; and that the study of workers' "welfare" is not only humane, but profitable.

At a recent Press gathering, Sir Arthur Balfour, the chairman of the Committee, stated that a third report, dealing with the condition and efficiency of industry, would be issued later in the year, and that this would be followed by a final report containing the Committee's conclusions.

The Census of Industry.

The disquieting news has lately been made public that the first of the preliminary reports of the Census of Production, recently carried out in respect of the year 1924, is not likely to be issued until the autumn, so that no date can be fixed for the appearance of the complete return. To be of service to the industrial section of the country and to justify the expenditure which a census entails, it is necessary for the results to be issued within a reasonable time. The delay is attributed in official circles partly to the fact that although they were sent out early in 1925, not all the forms have as yet been returned by manufacturers. It has, however, been somewhat tardily recognised that part of the blame is due to the fact that the forms sent out to producers were in many cases far too complicated. As an example of this kind, it may be mentioned that the engineering schedule was a formidable document containing 123 questions under 26 main headings; it has now been found that there are many firms concerned with only about half-a-dozen of these items, to which a much simpler form has lately been sent.

While it cannot be too widely known by manufacturers that the filling-up of the inquiry form is a statutory requirement which in the interests of all should be done as promptly as possible, it is equally important for those responsible for the publication of the Census returns to get them out quickly, as each month the information is delayed takes away part of their value.

The Electricity (Supply) Bill.

At the annual general meeting of the Southern Association of Gas Engineers and Managers in London, last week, Sir Arthur Duckham asked how the gas industry would feel if it were dealt with as a whole by a Bill like the Electricity Bill. According to *The Gas World*, "he thought they probably would feel very sorrowful and unhappy—and he was almost certain that that was the feeling of the electricity industry to-day. The Bill was by far the most Socialistic piece of proposed legislation that had ever been known. It was a Bill providing for Government interference in an established industry. . . . So far as the Bill would affect the gas industry, he believed it would be the finest thing that could happen, because for the next few years electricity development would be stultified." Nevertheless, Sir Arthur deprecated that view, remarking that the gas industry would like to see the electrical undertakings prospering and the country benefiting from the use of electricity for mechanical purposes.

Grateful as we are to the speaker for his kind words, we cannot but feel that electricity is indeed in parlous case when it is openly pitied by its rival. The worst of it is that Sir Arthur has accurately summarised the situation. The electrical industry regards the Bill in its present form with profound distrust and aversion; outside the ranks of its promoters, hardly a single voice is raised in support of its provisions. A powerful indictment of the Bill appeared in *The Times* of Monday last, from the pen of Mr. E. Garcke, who has witnessed the enactment and operation of the whole of the Electricity Acts from 1882 onwards, and earnestly protests against the "intolerable interference by the proposed Board with the responsible management of . . . the selected stations," and the discouragement of capital, and emphasises the fact to which we have repeatedly drawn attention, that relatively small economies can be effected in generation, compared with the large savings that can be made by cheapening the distribution of electricity. Mr. Garcke suggests that "all that is needed for the further progress of the industry is to give the Electricity Commissioners additional powers to overcome the artificial difficulties that exist in the way of the present undertakers marketing their product," instead of which the Bill imposes further restrictions and disabilities on existing undertakers, and "overloads the electricity supply business with Government officials and committees."

As we wrote the foregoing, the debate on the second reading of the Bill was in progress; the Labour Party was opposing it because it would not immediately bring about the nationalisation of electricity supply, whilst a number of Conservatives proposed its rejection because, in their opinion, it would inevitably have that result. The outcome of the debate, a report of which is commenced on p. 563, was that the second reading was carried by a majority of 325 to 127, and the Bill was referred to a Standing Committee.

Whilst going to press we have received from the Secretary of the Institution of Electrical Engineers a copy of a letter addressed to the Prime Minister on Monday, March 29th, which reads as follows:—

"The Council of the Institution of Electrical Engineers, after full consideration of the Electricity Supply Bill, now before Parliament, and the Weir Report, are of opinion that certain of the provisions in the Bill require material amendment, as they are based upon an imperfect knowledge of all the facts, and if embodied in an Act might be detrimental to the national interest.

"They therefore consider that it is of the greatest importance that the fundamental questions upon which the Bill is based should be the subject matter of an inquiry at which the various interests in the electrical industry may be heard before the Bill becomes law."

With this communication we fully agree, though the prospect of further delay is unpalatable—already progress in many quarters has been held up for more than a twelvemonth. It is a pity that such an inquiry was not held months ago. The sooner the whole question is settled and peace restored to a harassed industry, the better.

Electricity Supply at St. Helens.

Recent Extensions at the Croppers Hill Generating Station.

A public supply of electricity in St. Helens was first generated in 1896, by an a.c., 145-kW, 1,000-V experimental plant, erected by the Corporation at Warrington Old Road. The purchase of the tramway undertaking in 1897 by the Corporation brought about the erection of a new power station, combined with a refuse destructor, at Croppers Hill on the site of the present power station, to give a d.c. supply for lighting, power and traction, the supply being commenced in 1899 when the Warrington Old Road station was closed down. The original equipment at the Croppers Hill station consisted of two 125-kW and two 215-kW Mather & Platt d.c. generators, directly coupled to Willans & Robinson h.p. steam engines, four Lancashire boilers, and two Babcock & Wilcox water-tube boilers, the latter being used in connection with the refuse destructor. The station capacity was increased gradually to 1,840 kW in 1911, when an important advance was made by the installation of a 1,000-kW Westinghouse turbo-alternator, together with rotary-converter equipment, the introduction of e.h.p. a.c. enabling the Corporation to supply energy to the outlying districts. Additional turbo-alternators and the necessary boiler plant were installed as the load increased, including one 2,000-kW Dick, Kerr turbo-alternator in 1912, one 3,000-kW Westinghouse turbo-alternator in 1916, and one 5,000-kW Oerlikon machine of that description in 1921. In 1924 the output of the station reached 26,912,000 kWh; it became apparent that still further additions to the plant were essential, and the scheme for the recent extensions was formulated.

The new additions, which were inaugurated on March 23rd by the Mayor of St. Helens, Alderman Thomas Hamblett, J.P., include one 6,500-kW turbo-alternator and condensing plant, e.h.p. switchgear, one 1,000-kW motor-converter, one 40-ton electrically-driven crane, four 35,000-lb. water-tube boilers with mechanical stokers, a wagon tippler, coal conveying and elevating plant, the enlargement of the engine-house building, and the erection of a new structural-steel boiler house.

The turbo-alternator plant, fig. 4, was manufactured and erected by the Brush Electrical Engineering Co., Ltd. The turbine is of the Brush-Ljungström type, 3,000 r.p.m., and is supplied with steam at the main stop valve at 250 lb. per sq. in. at a temperature of 700 deg. F., with a vacuum of 27.5 in. of mercury. It is directly coupled to two Brush alternators having a maximum continuous output of 6,500 kW at 6,600 V, 3-phase, 50 periods, 0.8 power factor. All the main bearings, including the governor and thrust-block bearings, are lubricated by a continuous supply of oil under pressure from a rotary pump driven from the turbine shaft; a separate steam-driven pump is provided for use when starting up. The auxiliary pump can be automatically started in the event of the oil pressure falling below a predetermined value. A powerful automatic governor controls the movement of the governor valves through a pressure-relay system, thus obtaining most sensitive and positive governing. The governor can be adjusted at the turbine by hand operation, and also from the switchboard by means of electric control. The condenser is of the two-flow Brush surface type, capable of condensing 70,200 lb. of steam per hour when supplied with circulating water at a temperature of 80 deg. F., and it will maintain a vacuum of 27½ in. with the barometer at 30 in. The air extraction is effected by means of a Brush-Delas ejector plant having an air duty of 30 lb. per hour when consuming 450 lb. of steam per hour. The water is extracted from the condenser by means of a Drysdale No. 3 "Pervac" two-stage vertical-spindle centrifugal pump, capable of dealing with 86,000 lb. of water per hour, and delivering against a total discharge head of 47 ft., plus 28 in. of vacuum, when driven at 1,440 r.p.m. by a 10-b.h.p., 400-V, 3-phase, a.c. motor. Two motor-driven Drysdale "Bon Accord" pumps of the centrifugal type provide the necessary circulating water for the condenser. One of these pumps is driven by a 120-b.h.p., 480-V, d.c. variable-speed motor, and is capable of delivering 366,000 gallons of water per hour against a head of 50 ft. when running at 870 r.p.m.

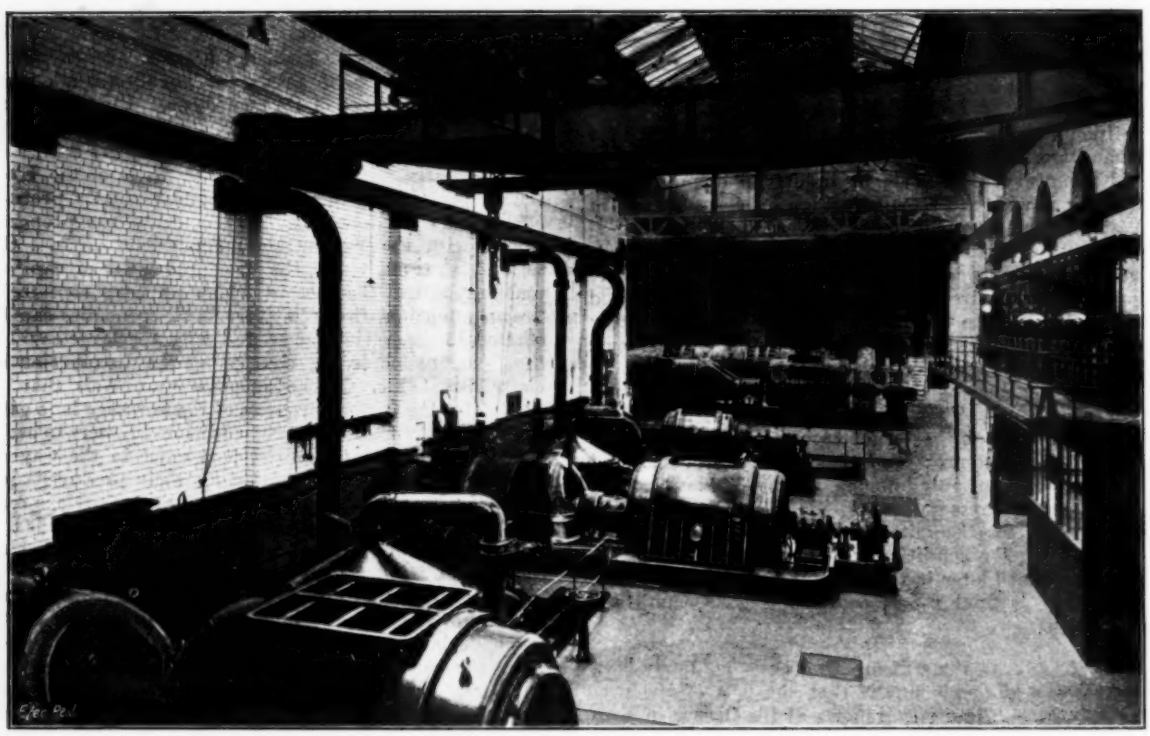


Fig. 1.—Turbine Room at Croppers Hill Station.

The second pump is driven by a 92-b.h.p., 3-phase, 400-V, slip-ring a.c. motor, and is capable of delivering 244,000 gallons of water per hour against a head of 50 ft. when running at 720 r.p.m. The cooling air for the alternators is supplied by a Standard & Oswald Stott fan, driven by a 47-b.h.p. motor, which delivers 24,000 cu. ft. of air per minute. The air is drawn through a Premier wet air filter, and a special alarm device is fitted to give a visible and audible signal in the event of the failure of the air supply. Electrical temperature thermometers are fitted at various points on the turbine, and these are connected up to an indicator mounted on an instrument panel. A Brady & Martin Kenotometer is provided for determining the efficiency of the condenser.

The e.h.p. switchgear was supplied and erected by the British Thomson-Houston Co., Ltd., and forms an extension to the main station switchboard. It includes the makers' standard 6,600-V solenoid-operated remote-control switchgear. The capacity of the oil switch is 1,200 A, the rupturing capacity being 180,000 kVA. The switchgear cubicle is of moulded stone, each compartment being provided with a sheet-steel door. An automatic voltage regulator of the Metropolitan-Vickers type is also provided.

The motor converter, fig. 4, supplied and erected by Messrs. Bruce Peebles & Co., Ltd., is compound wound, and designed for converting 6,600-V, 3-phase, a.c. to d.c. at 480/550 V. Fig. 1 is a general view of the engine room.

The overhead travelling crane is capable of dealing with any load up to 40 tons. For smaller loads up to 7 tons, an arrangement of chain gears is provided for rapid working.

The boiler plant includes four water-tube boilers, fig. 2, with superheaters, economisers, induced-draught plant, steel chimneys, grit arresters, soot-cleaning apparatus, a wagon tippler, coal conveying and elevating plant, coal bunkers, ash-handling plant and auxiliaries, including

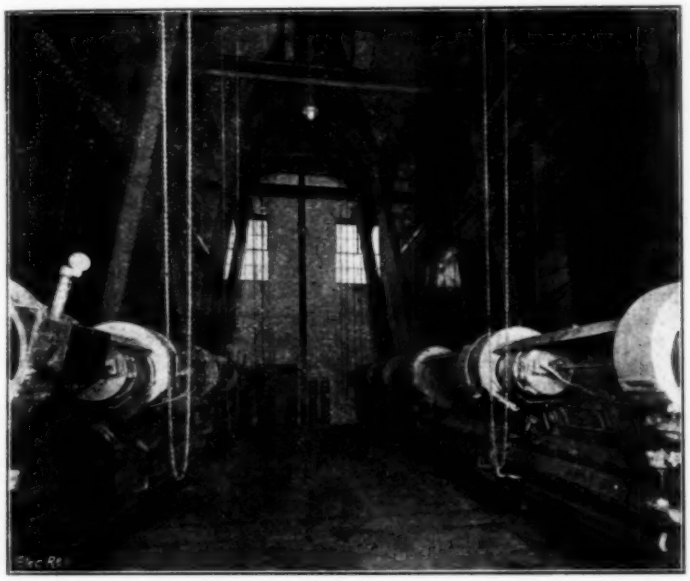


Fig. 2.—Boiler Extensions.

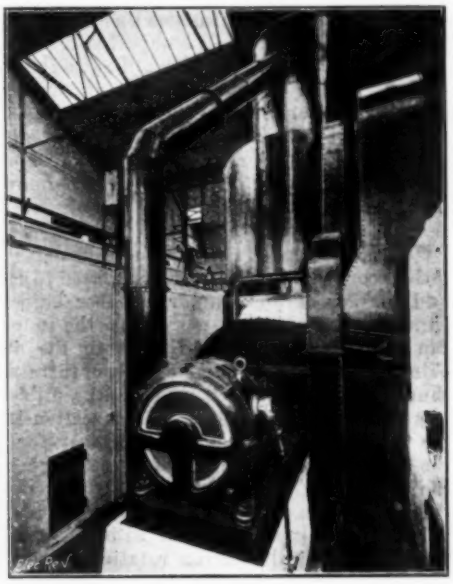


Fig. 3.—Induced Draught Fan.

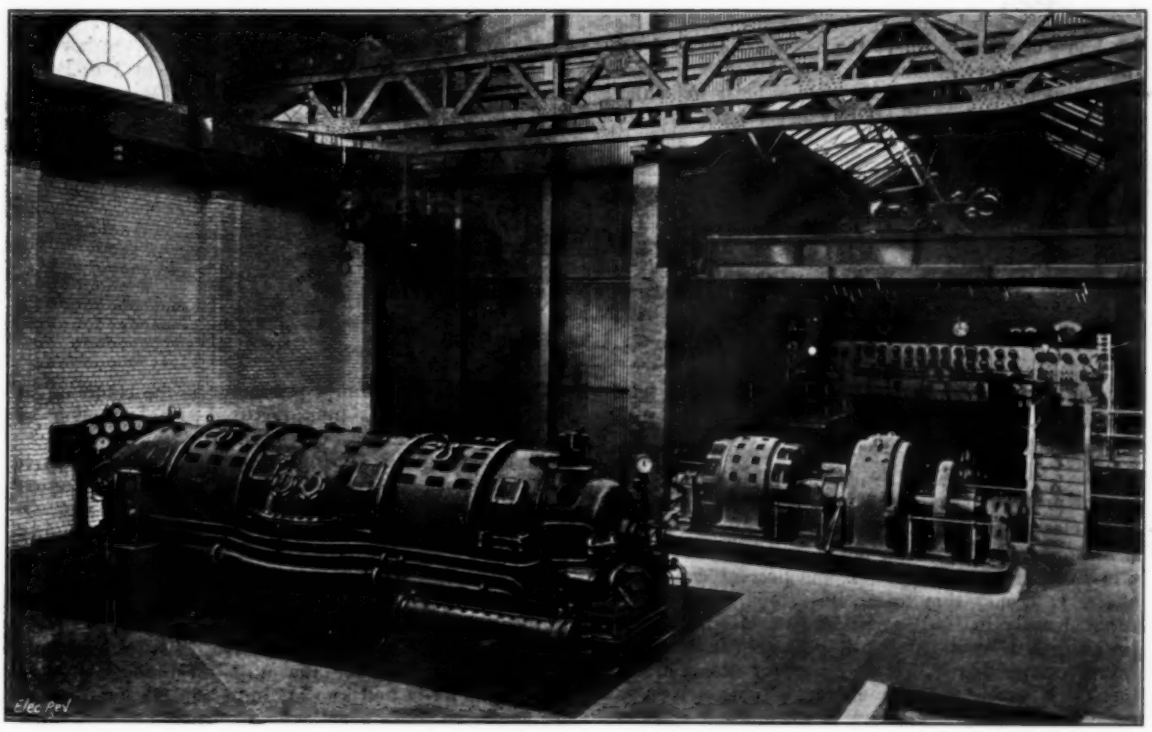


Fig. 4.—6,500 kW. Turbo-Alternator and 1,000 kW. Motor-Converter.

the steam ranges, supplied and erected by Messrs. Babcock & Wilcox, Ltd., and four type-"A" mechanical stokers and ash hoppers, supplied and erected by Messrs. Underfeed Stoker Co., Ltd. Each boiler has a heating surface of 8,019 sq. ft., and is capable of evaporating 35,000 lb. of water per hour, from feed water at a temperature of 110 deg. F., into steam at a working pressure of 265 lb. per sq. in. The external surface of the brickwork is cased with steel plates lined with magnesia slabs wrapped in asbestos. The superheaters have a heating surface of 2,581 sq. ft., and will raise the steam to 750 deg. F. The economisers are of the Green patent ringstay pattern, and each is equipped with 320 tubes arranged in two groups. One chimney and one motor-driven induced-draught fan, fig. 3, are provided for each pair of boilers. The chimneys are 7 ft. 6 in. in diameter, 150 ft. high, and are constructed throughout of steel plates. The fans are of the "Sirocco" centrifugal induced-draught type. A "Sirocco" grit arrester, fig. 3, is fitted to each chimney, and consists of an annular chamber built around the chimney into which the gases from the induced-draught fan are discharged. Adjacent to the inlet to the chimney from the annular chamber there is a patent shunt-type dust arrester connected by mild-steel piping to a cyclone type extractor. A connection is taken from the top of this extractor to the chimney for discharging the flue gases that are carried into the extractor back to the chimney. Each boiler is provided with a "Diamond" mechanical soot-blower installation of the valve-in-head type. To deal with the handling of the fuel, an electrically-driven rotating wagon tippler has been installed, and 12 to 15 wagons per hour can be dealt with. The fuel is tipped into a receiving hopper, 20 ft. by 13 ft., and falls into the elevator pit, whence it is taken by a gravity bucket conveyor and elevator and deposited into the coal bunkers inside the boiler house. The conveyor is capable of dealing with 40 tons of fuel per hour, and has a chain speed of 50 ft. per min. A set of coal-storage bunkers is provided, having a heaped capacity of 500 tons of small coal at 40 cu. ft. per ton. The ash-handling plant is installed in the boiler house basement, where the ashes are taken from the boilers by means of chutes into steel bogies. These are taken along a rail track to an ash hoist by which they are raised and automatically discharged into an ash bunker, prior to being loaded into railway wagons or carts for disposal.

The mechanical stokers comprise eight class "A.7.G." self-contained forced-draught travelling-grate stokers, each having a grate area of 192 sq. ft. Each pair of stokers is capable of dealing with 3¼ tons of coal per hour. Two forced-draught fans are fitted to each stoker, and these have cast-iron housings formed as part of the coal hoppers, and one 8-b.h.p., 480-V, direct-current totally-enclosed motor is utilised for driving each stoker and pair of fans.

In order to accommodate the new turbo-alternator plant, the original engine house, the Lancashire boiler house, and works office, have been demolished, the new engine-house extension being erected on the cleared site. The last of the old reciprocating sets have also been removed. The floor of the engine-house extension is 3 ft. higher than that of the other section, except a portion under the 40-ton crane where the original level has been retained to facilitate the loading and unloading of material. The new boiler house has been erected on a site which was occupied by the refuse destructor, so that this structural-steel building adjoins the engine house. The building comprises a basement, 12 ft. high, a firing room, 34 ft. high, and an economiser room, 29 ft. high. Ten compound stanchions support the fronts of the boilers, the coal bunkers and the firing and economiser floors, and extend from the basement to the underside of the main bunker cross girder, and ten roof trusses of 40-ft. span are fixed over the boilers, and are complete with ventilators. The roof is covered with asbestos sheeting secured to the steel purlins with galvanised hook bolts, and six lines of patent glazing extend the full length of the buildings, forming the roof lights.

It is gratifying to see that St. Helens has for a long period progressively held a very favourable position for high efficiency and low costs. For the year ending March, 1923, the working costs were 0.56d. per kWh sold, the average price per kWh being 0.96d. In 1924 the working costs were reduced to 0.49d. per kWh, and the average price per kWh was 0.84d.

In conclusion, we would like to express our thanks to Mr. F. N. Rendell Baker, A.M.I.E.E., the borough electrical engineer and manager, and to the Brush Electrical Engineering Co., Ltd., for their assistance in the preparation of the above particulars.

Second-hand Plant.

Its Waning Influence on Market Prices.

By E. GRAHAM.

Among the many post-war problems which the industrial section of the electrical industry has to face, the problem of second-hand plant has, of late, become pronounced. It is possible to trace qualitatively the history of present second-hand plant, and from that to obtain a clearer idea of current conditions than at the moment appears to be held by many.

It is insufficient to state that the present condition of affairs is simply due to the enormous boom which culminated early in 1921, and then suddenly fell away. While quite a true statement, it goes no further than the words comprising it. It does not, for example, say by just how much has the current situation been so brought about, nor does it say if the present state of affairs is likely to continue or not.

It is therefore interesting to trace the price career of a very representative industrial unit, *viz.*, a direct-current motor of D^2L value about 350 cu. inches. This armature core size represents a motor of the semi-enclosed type, developing about 15 h.p. at 1,000 r.p.m., a unit very comparable with the present actual average output unit. A certain representative maker turning out plant between the limits of 1 kW and 250 kW, reckons 12 h.p. to 25 h.p. per motor as the result of the fraction: total h.p. manufactured ÷ total number of motors sold over the last three years.

In accepting this 15-h.p. machine as representative due cognizance is taken of the fact that its manufacture is entirely dependent upon industrial conditions generally. The demand for the unit arises from those industries requiring means to aid them directly in coping with their own outputs. These concerns first require power and then the means to make use of it. The size of the unit, further, places it outside the range of the domestic load; which is to say, the domestic load only affects the demand for the unit through some other industry. As is well known, industrial electric motors are employed upon practically any duty one can think of: pumps, workshop drives, sugar making, baking, printing, cranes, anything in fact "from a needle to an anchor," so that the 15-h.p. unit chosen really constitutes a remarkably good barometer of industrial conditions generally.

It is to be expected then that any boom occurring in the electric motor trade would occur just prior to a boom in any industry making use of motors. Further, in view of the electric motor's extreme mobility of appli-

cation, it is to be expected that any boom would occur in its manufacture appreciably before a general trade boom. This is actually the case, as will be seen from a consideration of the curve shown herewith.

The graph shows the variation of a certain *maker's* price of the 15-h.p. unit chosen over the period 1913 to current date, and is rather remarkable in its shape. The actual values, while instructive, are of little moment for the present purpose, as the shape of the curve is the main clue to the subject.

According to official statistics of all kinds, but mainly B.O.T., the general trade boom attained a maximum value about January 21st, 1921. Some authorities date it considerably later, others a little earlier, but January 21st seems to be very near the mark. The main maximum of the curve given occurs in September, 1920, bearing out very well the remarks just made.

The law (so called) of supply and demand states, or infers, that the price rate of increase of any given article is proportional to the difficulty of obtaining the article, and similarly that the price rate of decrease is proportional to the ease of obtaining the article. An examination of the curve will show that the two slopes on either side of the main peak attain their maximum values about December, 1919, and March, 1921. The period between these dates is precisely the period of time over which the obtaining of plant of any kind was almost an impossible task. Buyers then could not get early delivery of anything. The reader will well recollect interminable discussions and complaints, in this and other journals, of ill-kept delivery promises and of the many panaceas put forward to cure the trouble. The maker of the industrial units here considered could not then undertake delivery of most orders under eight, nine, ten, and sometimes twelve months. The state of affairs was phenomenal, of course. Manufacturers all over were literally choked up with work. Agents simply had to sit still and stretch out their hands for orders as for tricks at cards.

All this is reflected (or perhaps, foretold) in the curve. From September, 1920, until August, 1921, the curve falls off rapidly, indicating that demand had fallen off, and that all work in hand had been completed. In its turn this caused a slightly better feeling to prevail, plant being more easily obtainable, as is shown by the curve bulging slightly until about April, 1922.

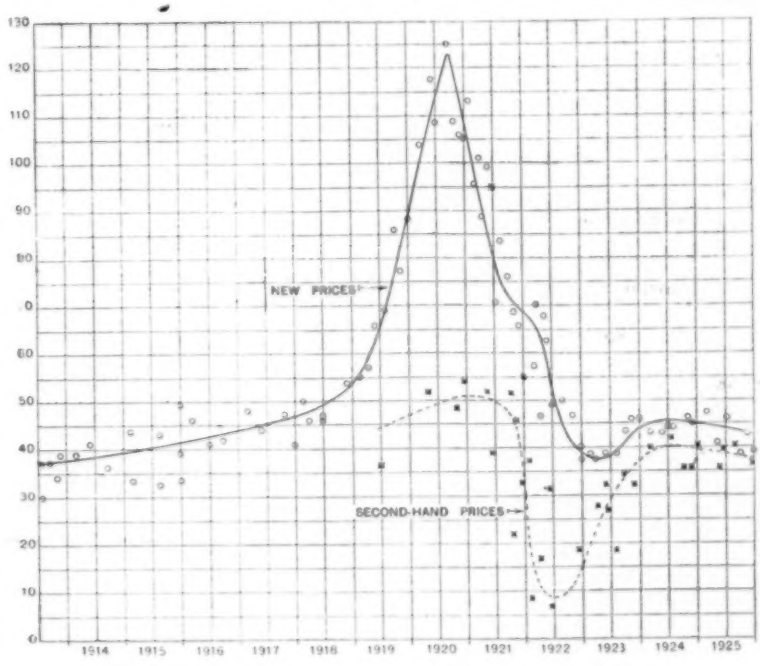


Fig. 1.—Variation in Price of a Certain Make of 15-h.p. Electric Motor.

At this point it is meet to notice the dotted curve of second-hand prices for the same unit. This curve was plotted from sales catalogues to begin with, and latterly from second-hand advertisements in various journals. It therefore is not quite so accurate as the other, since the "new" curve is solely based on prices obtaining at the works. Second-hand figures plotted from two different consecutive sources are bound to cover the profits of at least two transactions. The shape of the second-hand curve is, however, sufficiently accurate for the present purpose, which is purely qualitative.

It will be seen that, about February, 1922, the market was evincing a decided tendency to firm up. The memory will recollect, too, that at this time many of our wisest financiers strongly advocated a rigid control, either by the Government or by the great trade associations, of the *rate* of that certain decapitalisation then prophesied. No heed was paid to their counsel, which is seen from the curve to have been wisely inspired. Instead, industry, seriously over-capitalised in plant, made a sudden dash for safety after April, 1922, by attempting to cut all losses as quickly as possible. The period tallies well with the average company's yearly audit. After the books for 1921 had been squared off, the serious position then divulged forced precipitate action upon all over-capitalised concerns, with the net result that plant of every description was practically given away in the mad dash for safety. The state of affairs then is again clearly indicated by the curve. It drops very rapidly from April, 1922, until well on into 1923.

The speed at which plant was got rid of by manufacturers, &c., was only paralleled by the avidity with which it was brought up by dealers of every class and kind. Any man and every man who had any spare cash at all bought plant, whether he knew anything about it or not. Some of them were "bitten," but it must be confessed that the majority have come off fairly well. At any rate the effect on the electrical unit was disastrous, and it was only in October, 1922, that it showed again any sign of steadying up. From that date until March, 1923, the fall was less rapid, the curve reaching a minimum value in March. By that time the gradual slacking-off of sales was beginning to have its effect, for, before the manufactured unit reached its lowest point, the second-hand machine had commenced to rise in value and to rise fairly quickly. That demand which is small, but persistently ever present, had begun to make itself felt once more, and acted conjointly with mutual buying and selling between dealers only. Coupled with the stress of the financial embarrassment of 1922/3, this caused a rapid appreciation in the value of second-hand plant. The more stable part of industry, however, clearly neglected the second-hand unit, so causing the new unit to steady up.

Second-hand values attained a maximum about July, 1924, just as a flattening-out of the price of the new unit began to take place, indicating that the economic conditions necessary to cope with the small steady demand mentioned were, at that time, generally fulfilled. That is to say, the total amount of plant then capitalised stood at an economic figure.

This state still holds to date, for, at the point noted, the second-hand curve becomes appreciably steady, falling only slightly until to-day. It should be noted, though, that exactly steady figures of second-hand gear are not too easily obtainable now, and from the current falling-off of the new unit curve it is possible that at present the relative value of second-hand plant is a little lower than that shown. At any rate, it is not much higher, but however so, encouragement is to be found in noting that the difference betwen the two curves is only about ten per cent.: not too much when all is said and done.

and even this ten per cent. difference is now being wiped out, as the following experience shows.

A certain industrial electrical concern of late has instituted a thorough system of searching the second-hand columns of all the most important daily papers in the country. Where a second-hand machine is advertised for, a new machine is immediately offered at a very keen figure. True, the total number of advertisements is not great. About a dozen per week is reckoned a good figure, but the firm estimates that out of every twelve quotations submitted in this manner, two orders result, and these mainly from new customers. Other firms are very likely acting similarly, and it is quite likely that the major portion of the remaining ten machines is secured against the second-hand plant in a similar manner.

Thus the curves cannot be widely out, and the obvious moral is that things generally are approaching a condition of stability once more.

That present new prices are so competitive means that dealers now selling second-hand gear are in such a position generally that for them to lower second-hand values would spell loss, for, actually, plant that is now "second-hand" is very likely "third hand." The rise in the second-hand curve until July, 1924, was too rapid to be explained by industrial buying alone. Industry had then too lately got rid of the plant, and naturally did not re-buy. The appreciation, while affected by the small permanent demand, was largely due to buying and selling between dealers themselves. The majority of dealers who bought in the slump days have now got rid of the gear to other, and perhaps less fortunate, brethren, who cannot now afford to sell at anything like the prices ruling when they bought, and this is made the clearer if it be noted that the rate of absorption of second-hand plant is fairly proportional to the slope of the second-hand curve, at present sloping down very slowly. This means that the rate of absorption has passed zero mark and is now negative, which, in its turn, means practically that second-hand plant has had its day.

This is not surprising when, in addition to the foregoing, it is considered how much entirely special gear was in use prior to the slump. The rigorous demands of mass production resulted in a flood of machinery made solely for one or two purposes being supplied to industry generally. Naturally, in slack times, a general purpose machine takes the place of several of these highly-specialised machines, with the result that, when the sales took place, the latter were among the first to be thrown on the market. They are still there, and they are causing much trouble to both dealer and manufacturer alike. The dealer cannot get rid of them, and the result is that the maker is now engaged in rectifying second-hand plant that had been "faked" up to suit normal duties. No guarantee being available, the plant is peculiarly liable to all kinds of "touching up," as an example or two will show.

A batch of vertical motors was bought up by dealers who altered the machines by simply cutting off the stools and turning the motors on their sides. A few weeks later the original makers were inundated with complaints of bad bearings, bad everything. It transpired that no alteration had been made to the hollow bearing carrier or single thrust bearing. Instead of being mounted on the solid shaft and suitably clamped, the bearings were left loose. Naturally the fat was in the fire, and how much potential business has passed the makers as a result of the psychological effect of the trouble is hard to estimate. It must run into hundreds of pounds!

It is a common occurrence to come across a second-hand motor, originally designed for, say, 440 volts, 1,000 r.p.m., sold with only the fields paralleled to run at the same speed and power on 220 volts.

A machine, originally designed for 220 volts, had its interpoles removed and its field coils connected in parallel for 440-volt running. Similarly, some slip-ring machines were re-sold with the rings shorted, and "suitable for switching on the line." Perhaps the reason for this was that the motors had already been run minus the brushes on one ring, and that the starting resistances had been removed, likewise the time lags from the circuit-breaker. Again, odd squirrel-cage motors will be found mounted on channels with odd ram pumps, no provision being made for by-passing the pump at starting. One plant of this kind further had a link removed from the starter, so causing the motor to run on single phase. Certain motors, heavily compounded for driving flywheel-operated machinery, were actually used as battery-charging dynamos by cutting out the compound winding. Strange to say, trouble did not arise until field regulators were inserted!

These abnormalities could be amplified almost indefinitely, and they have had their effect. Buyers have had their "medicine." Hence they are slowly leaning over to new plant, provided that the price be suitable. The present difference of approximately ten per cent. is evidently sufficient to effectively counterbalance constructional and guarantee disadvantages, and, therefore, new plant is once more coming into its own. While new prices are still falling slightly the (to all intents and purposes) parallelism of the two curves shows certainly that the influence of second-hand plant is surely waning. The falling of the second-hand curve commenced 15 months ago, and the rate of fall is appreciably steady, a certain sign that second-hand gear is no longer exercising a potent attraction on buyers in general. Individual instances, of course, must still have their influence on the general situation, and it is probably these instances which have caused the slight fall in new prices, it being borne in mind also that not very long ago "ring" prices were cut rather considerably. (The curve does not represent ring prices). It is felt, however, that this is only a temporary phase, and that it is reasonable to expect, with the more complete sifting out of good and bad second-hand plant in process of time, that the curve of the new unit will again rise.

The process must, of necessity, be slow. Cost accountants know full well that at present industrial electric motor prices are of the order of 20-40 per cent. on net material alone, a state of affairs bordering too closely upon the dangerous to give cause for any satisfaction. Only the most modern methods of production can cope with this, and then only if the market exists.

Fortunately, from the decreasing effect of second-hand plant, it may be taken that the market, if not at present existing, is again in the process of gradual creation, and the near future may, therefore, be regarded with greater confidence than has hitherto prevailed.

Preserving Power Poles.—The power pole problem is causing considerable perturbation among Power Boards in New Zealand, and the increasing scarcity of native timber is making the problem a contest between foreign timber and home-grown makeshifts, with a possibility of the concrete pole slipping into first position as the result. Several Power Boards have experimented with home-grown foreign timber, imported poles, and native timber not hitherto proven satisfactory for pole purposes, and the results have not been very reassuring, inasmuch as many of the experimental poles rapidly deteriorate under weather pressure, resulting in bad breaks and some serious accidents and fatalities.

The Thames Valley Power Board, N.Z., has been experimenting with poles under similar conditions, and has instituted a further test of methods of preserving poles from weather effects. The first series of experiments were with State Forest Service poles erected in sandy soil in an exposed situation, and six different species of timber were included in the test. The experiments were conducted by Mr. N. G. McLeod, the Board's engineer, who tried some 13 different treatments. The first trees were treated with a special preservative mixture in two different strengths, either brushed on hot, or the poles dipped therein. Hot creosote, brushing or dipping; butt charred without other treatment; butt charred and creosote dipped; and butt charred and dipped in hot tar, were the other methods used. A complete check of the trees and their treatment has been recorded by the Board, while observations will be made from time to time to ascertain the results, and a valuable record for posterity should result.

Eye Essential.—At the sixth conference of the season of the North-Eastern Area Sub-Committee of the British Electrical Development Association, held on Wednesday, March 24th, at Newcastle-upon-Tyne, Miss Anna Holm spoke on "Women's Influence in Electrical Development."

Oil Engines in Parallel.

Test Results of Two Heavy-Oil Engines on Electrical Load.

It appears to be not generally realised to what extent success is met with in the running of oil engines in parallel on electrical loads, particularly in connection with 3-phase a.c. supplies. In this connection some culars of two 100-h.p. heavy-oil engines, made by the the Campbell Gas Engine Co., Ltd., which we recently saw under test, driving 3-phase alternators in parallel, together with an outline of the test results, may prove of interest. The engines were built to the order of the Crown Agents for the Government of Ceylon, where the

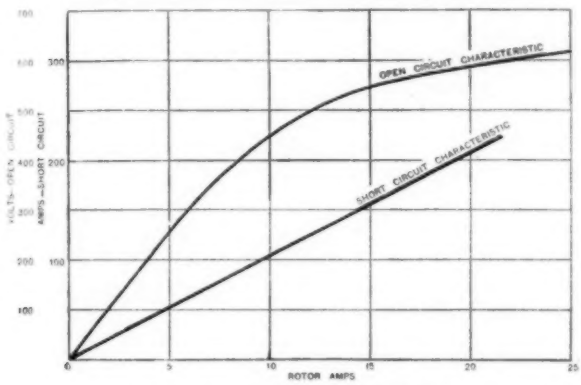


Fig. 1.—Alternator Characteristic Curves.

plant is to be installed with a view to its possible future running in parallel with hydro-electric plant. The engines are identical in every way, and are of the four-cylinder pattern. Each works on the four-stroke cycle, and the fuel is injected through a mechanical atomiser at the end of the compression stroke. Probably the most interesting feature of the engine, to which no doubt the successful results obtained are due to a large extent, is the governing system. Each cylinder is served by its own feed pump, and the stroke of this is varied by the governor through a system of cam and lever apparatus. The governor is of the ordinary spring-loaded centrifugal type, and varies during its operation the vertical position of a small roller mounted at the end of a suitable arm. This roller forms the fulcrum of a lever, one end of which is in contact with a projection of the feed-pump plunger, the other end being acted upon by a cam carried on a horizontal shaft which is worm-driven from the main crank shaft.

The engine is started from cold by means of compressed air without any preliminary heating, the necessary ignition commencing automatically. Starting valves are provided on two cylinders. The governor, which is fitted for hand control, is gear driven, and is designed to maintain constant speed within 5 per cent. for a momentary load variation from full to no load, and 3 per cent. for a permanent variation. The flywheel is of the heavy type, with a coefficient of speed fluctuation not exceeding 1/250. The cylinders are water-jacketed, being provided with removable liners. The inlet and exhaust valves are cam operated. Forced lubrication is provided to all the enclosed bearings, the pressure being produced by positively-operated ram pumps.

During the tests the engines were directly coupled to two 55-kW 50-cycle alternators, made by the Lancashire Dynamo & Motor Co., Ltd., and two 3.75-kW shunt-wound exciters of the same make. The engines were first run on a five-hour full-load test for steady running and fuel-consumption observations. During that period the maximum load variation on "A" engine was between 54 and 55.8 kW, and the average fuel consumption amounted to 0.654 lb. per kWh, or 0.420 lb. per b.h.p.h., the alternator efficiency being 86 per cent. The maximum load variation on "B" engine was between 54 and 55.44 kW; the fuel consumption was 0.708 lb. per kWh, or 0.459 lb. per b.h.p.h., with the same efficiency for the second electrical machine.

A two-hour overload test was next applied to the machines running in parallel, when a steady load of 68.4 kW was maintained on each machine. An extra overload was further put on the parallel engines, when each took 73.8 kW. Another test included the instantaneous throwing of the load of one machine to the other by breaking the circuit of the first alternator; this process was also reversed. The engines were further subjected in parallel to variations from full load to quarter load in about 20 seconds. The last three entirely successful operations were not included in the official tests, as laid down by the consulting engineers, but were undertaken at the request of ourselves to subject the machines to as severe a test as the facilities available would permit.

The official tests were carried out under the supervision of Messrs. Preece, Cardew & Rider, consulting engineers to the Crown Agents.

Reference to the characteristic curves of the alternators, fig. 1, will no doubt add to the interest of the above particulars. Fig. 2 shows one of the sets complete as it appeared on the test platform.

In conclusion, we are indebted to the Campbell Gas Engine Co., Ltd., for the facilities offered to us to see the engines under test and collect the above particulars, and to the Lancashire Dynamo and Motor Co., Ltd., for placing the characteristic curves of the generators at our disposal.

Motor Vehicles Parade.—In connection with the London and Home Counties Division of the Commercial Motor Users Association, the twentieth annual parade took place in Lincoln's Inn Fields on Saturday afternoon, the object being to encourage drivers to take a personal interest in the driving and the condition of their vehicles. About 200 vehicles had been entered, 144 being petrol driven, 24 steam, and 15 electrical. A feature of this year's show was the section for electric vehicles, of which there have never previously been more

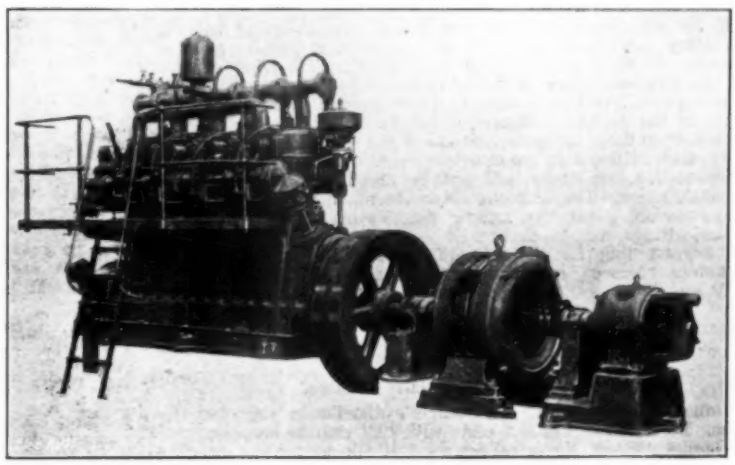


Fig. 2.—Complete Engine and Alternator Plant.

than half-a-dozen, but in view of the co-operation of the British Electrical Development Association, which, in addition to nominating two special judges, awarded a number of prizes for the best electric vehicles on parade, the number was likely to increase. Willesden District Council took first honours in the electric-vehicle section. Prior to the parade a large company was entertained to luncheon at the Savoy Hotel; Mr. W. McDowall occupied the chair, and Lt.-Col. J. T. C. Moore-Brabazon (Parliamentary Secretary, Ministry of Transport) was the principal guest.

Correspondence.

Correspondents should forward their communications* at the earliest possible moment.** ***No letter can be published unless we have the writer's name and address in our possession.

Country-House Fires.

The facts regarding two of the recent but not serious country-house fires reported in the daily Press may be interesting to your readers.

The electrical installations were carried out in screwed steel conduit by my firm, and nothing electrical was to blame.

Both fires were definitely traced to old boiler flues, used for new boilers of about 10 times greater capacity than those in use up to five or six years ago. In one case, the fire broke out right up on the second floor, and in the other on the first floor. Something else might have been blamed if the cause could not have been traced fairly easily.

One fire was put out by means of pails of water and a local fire engine, but resulted in considerable damage, and the other was got under quickly by means of an electrically operated fire protection plant and a well-trained staff of servants.

Installation work in country houses where generating plant is employed is usually of better quality and workmanship than in town houses, the reason being that consumers, architects, and consultants select their contractors with greater care and price is not always placed before reputation.

The consumer will often, unfortunately, allow a chauffeur or semi-skilled engineer to make small extensions and alterations to existing wiring, and the fire risk in that work is sometimes serious. I have seen good jobs spoilt by these extensions, carried out carelessly on motor-car wiring lines.

H. T. Young.
Pp. Troughton & Young.

London, *March 22nd*, 1926.

"Yet more mansion fires caused by the fusing of electric wires."

The monotonous recurrence of the above statement in the daily Press calls for very serious consideration and explanations.

Electricity is now considered without a rival as an illuminant, and a very convenient vehicle for power for all purposes, and should be absolutely safe. But, unfortunately, it has become such a willing servant and so docile that any Dick, Tom or Harry considers himself an expert electrician and forthwith runs a pair of wires *via* a switch to a lamp, and forsooth the lamp lights!!

Granting that the first installation is put in by a reputable firm with conscientious men, they hardly turn their backs when another light is wanted somewhere, and the chauffeur or head gardener, or some other handyman undertakes the job, quite oblivious of any rules even of common sense, much less the I.E.E. rules.

Now if every insurance company were to employ a qualified electrical engineer to examine all installations occasionally, he, with his Megger, galvanometer, and battery could very soon detect the various little slips committed by the local tiro, and save the client the unfortunate loss of valuable things and sometimes lives that cannot be replaced, besides much good property.

If the engineer only saved one fire a year it would pay his salary many times over, and save much heart-burning and regrets. At the same time he could cast an inquiring eye on the fireplaces to see if the local jobber had concreted the hearth properly before putting in that beautiful modern well grate in the various entertaining rooms.

Now, even those insurance companies that have an engineering branch affiliated do not cause very careful tests to be made for insulation, continuity, and earthing of a lighting and heating installation. They concentrate on the moving machinery—prime movers, generators, motors, &c., leaving the vulnerable cables, fittings, &c., to chance.

I suggest that for the sake of the electrical trade, and insurance business, independent examination of all installations should be made compulsory.

J. Price.

Manchester, *March 25th*, 1926.

The Government Electricity Scheme.

I must protest against Mr. Hodges's diatribe in your last issue. I was comparing 1924 costs with 1924 charges according to Garcke, 1924-25 the latest figures available to one not connected with Mr. Hodges's company.

But since my last letter, both the draft Electricity Bill and the Weir Report have been issued, and I now feel that we can calm Mr. Hodges's fears. In all probability his bulk supply will cost him much less than 3d.; in any case, he will not be called upon to pay more for his electricity than his present total cost of generation. After reading the Weir Report, one feels inclined to say that Mr. Hodges's figure of 3d. per unit of bulk supply at his works is much too high.

These two facts, I feel, sufficiently answer Mr. Hodges. But I must protest against his drawing a red herring across the trail by comparing his purchase price with his lowest selling price; although in 1924 he was selling *some* electricity at 1½d. per unit, his average revenue (according to Garcke) was 7.39d. per unit: obviously offering a sprat to catch a mackerel, a policy which, according to his letter in your issue of February 26th, is "sheer folly and absolutely uneconomic"!

H. J. Allcock.

Manchester, *March 26th*, 1926.

[This correspondence is now closed.—Eds. Elec. Rev.]

Electrical Engineers' Data Books.

Referring to your review of the above books in your issue of March 26th, I understand from the publishers that the first few copies of the books were bound, for some reason (or lack of reason) unknown to me, with the indexes in front of the appendices. This was quickly rectified, but as copies for review are the first to be sent out, you apparently received one of the few with the index so misplaced.

With reference to the two-volume arrangement of the work and your statement that it would have been better to combine Vols. I and II, I should like to point out that Vols. I and II can also be purchased bound in one volume with one appendix, and in this way it may be obtained at the reduced price of 28s., instead of 15s. each volume.

D. V. Onslow, A.M.I.E.E.

London, *March 27th*, 1926.

The Qualifications of a Salesman.

I read with interest and amusement the advertised vacancy for a sales assistant, appearing in your columns to-day. It appears that applicants are particularly requested to state among other things, birthplace, college attended, &c. The point I wish to raise is this: Have a man's birthplace and the names of his colleges, as such, any bearing on his abilities as a sales assistant? Presumably the odds are in the applicant's favour if he were born, say, in Criccieth rather than in Wigan. The questions of vaccination, measles, &c., were omitted, doubtless reserved for the "personal interview."

Your advertiser runs a grave risk of overlooking the man who can *do* things, in favouring a man whose qualifications will probably extend no further than a high-sounding college name, and the possession of a three-valve wireless set!

Can British employers learn nothing from democratic America, where "efficiency" counts, and a man is given the opportunity to "prove" himself?

Qui Pense.

March 26th, 1926.

The Single-phase Earth Return System.

Owing to an appointment in the country I was prevented from attending the discussion on "Electro-farming" at the Institution of Electrical Engineers; I should have liked to refer to the single-phase earth return system, which is mentioned by Mr. Borlase Matthews in his reply, because I feel certain that until this system is permitted in this country, the cost of electricity for rural districts will be prohibitive.

I have only advocated this because I have seen what has been done in other parts of the world in rural districts by the adoption of this system. There are practically no uses of electricity in rural districts that absolutely necessitate the use of a 3-phase system. There seems to be still an unwarranted prejudice against the use of single-phase motors even for small powers. Surely, when, broadly speaking, single-phase earth returns can be adopted in crowded cities to drive railway trains, the interference with other electrical systems can be overcome. Universal three-phase is a craze, and people will not realise what single-phase can do.

I have not referred to the subject for some time because it seems like beating the air, and an ordinary person has not got the time for that. At the same time it is worth pointing out that in about half the cases I am interested in, we are able to buy electricity at reasonable rates, invariably on the three-phase system, and in the other half local generation has to be resorted to. I can unhesitatingly say that were single-phase earth returns permitted, in no single case would it be necessary to erect a local generating station.

A. Hugh Seabrook.

London, *March 26th*, 1926.

Printing Office Lighting.—An interesting and novel lighting scheme has recently been introduced into the *Daily Express* machine rooms. The printing presses are now illuminated by 100-W White Osram gasfilled lamps suspended around the machines, superseding the older method of installing lamps in difficult and inaccessible positions amid the machinery. The great vibration of the modern printing press demands the use of lamps which will stand up to the severest conditions, at the same time maintaining such an intensity of light as will enable any mechanical defects in the machinery to be instantly observed, and removed whilst the machines are running. An interesting sequel to this installation was afforded when a quantity of molten lead was spilt over one of the lamps; the latter was withdrawn by its flexible cord, with several pounds of lead adhering to it, and it remained lighted.

Selected Radio-Telephone Apparatus.

Recent Developments and Improvements.

"Nick-o-Time Tunometers."

The above-named products of the Tunometer Works (proprietors: M. & A. Elliott) are interesting in that they are claimed to be the only commercial type of "infinitely variable all-wire tuners available for adaptation to electromagnetic coupling, allowing high inductance to be obtained and reactive capacity tuners to be dispensed with on wavelengths below 600 metres. The sample aerial and reaction tuners and fixed inductance coils which we have received are excellently made and an important constructional feature may be noted: The plated 18-gauge bare copper coil is uniformly spaced as indicated in fig. 1, and a rotary contact wheel is employed to enable the wavelength desired to be accurately tuned without the aid of a condenser, giving fine adjustment, greatest inductance, and minimum capacity. The A-type coil itself, in conjunction with the average aerial, should tune to 368 m.; by removing the shorting plug and inserting the standard 35 to 50 coils, it should tune to 600 m., and for reception on 1,600 m. the tunometer may be shunted with a 0.0003 mfd. variable condenser, which, however, should be completely switched out of circuit when working in the B.B.C. wave band. It may be pointed out that although the wire appears to be embedded in the groove in its ebonite former, it is not so, as the wire makes contact with the former throughout the length of each spiral at only two points, which feature results in low distributed self capacity. The small losses, uniform coupling, and regular convolutions of the conductor make the use of only a small amount of reaction necessary, while the reduction of capacity which is possible by the use of these coils makes the use of a low-impedance detector valve desirable, similar to the B.T.-H. "B4."

The aerial "series vernier," fig. 2, is similar in construction, affording a means of fine final control. It is provided with a neat ebonite fixing bracket, which may be easily removed if one-hole attachment is preferred; the terminal of the outer convolution is preferably connected to the aerial side.

Plug-in type nox-variable inductance coils are also made in the same manner; as no two turns come into contact or cross each other throughout the length of the spiral, the condenser effect between turns is reduced greatly. The method of construction implies great mechanical strength, and such coils will not absorb moisture, being easily cleaned with a duster.

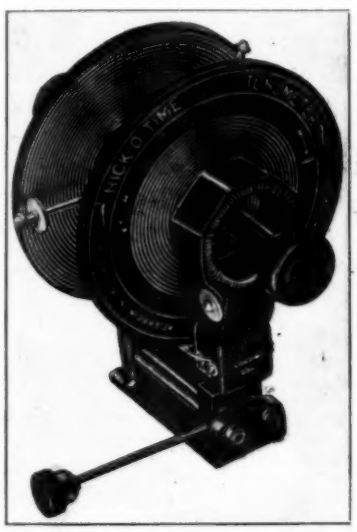


Fig. 1.—"Nick-o-Time" Reaction Tunometer.

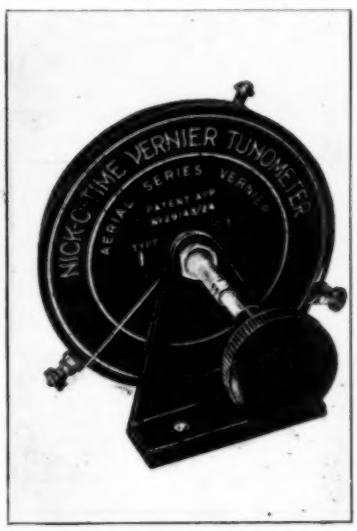


Fig. 2.—Aerial "Series Vernier."

A New Accumulator.

We are informed that the HART ACCUMULATOR CO., LTD., has recently placed a new low-pressure accumulator cell on the market for radio work. It is said to be specially made for use in conjunction with dull-emitter valves, and is known as the "Enduro." A strong glass box is used having internal ribs, between which the five plates are fitted, and a sealed glass lid is provided. The 2-volt cell has a capacity of 10 Ah (20-hour discharge rate) and weighs about 5 lb. with acid; it is 2¾ in. long, 4 in. wide, and 5¾ in. high. When a larger cell is required the "Magno" type (25/50 Ah capacity) is available.

Apropos recent references to the radio-telephony of Mr. Derek Shannon, of Sutton Coldfield, who "succeeded in speaking . . . to a man in Mexico City . . .," we are informed that the results were secured with the aid of two 100-volt "RAO"-type Hart high-pressure batteries.

Loud-speakers.

Surprisingly good results are obtainable with home-made loud-speakers. The "Lissenola" attachment, in conjunction with a paper diaphragm, or horn, can be made to give good results, and experiments in this connection should be fruitful. Dr. Lee de Forest's latest invention is said to be the "Audalion," that utilises a paper cylinder which receives vibrations from a reed; it is claimed that the instrument radiates sound uniformly in all directions. Another new speaker is the invention of Dr. N. W. McLachlan, who recently demonstrated it in the course of a lecture before the Radio Society of Great Britain. It is of the cone type fitted with an external annular baffle to balance the upper and lower tones.

A Buoyant Valve-holder.

Designed to impart buoyancy to the valve and protect it from vibration, the holder illustrated in fig. 3, of which we have received samples from MESSRS. GARNETT, WHITELEY AND CO., LTD., have given satisfaction in service. As is shown in fig. 3, the centre piece, which contains the phosphor-bronze valve-leg sockets, is free to move in all directions, stops being provided to protect the nickel-silver springs when inserting and removing the valve. The holder is made of genuine Bakelite, the leg sockets are recessed to prevent shorting, and the terminals stamped G, FF, A on both sides.

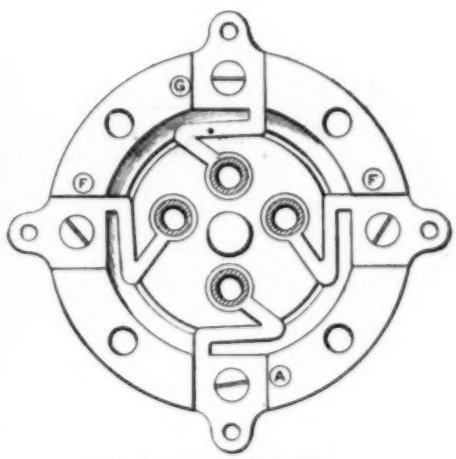


Fig. 3.—"Lotus" Valve-holder.

Variable Condensers.

THE GENERAL ELECTRIC CO., LTD., has added another unit to the range of "Gecophone" low-loss, slow-motion variable condensers. The original series were of 0.001, 0.0005, 0.0003, 0.00025, and 0.0002 mfd., and the new addition is 0.0001 mfd. They conform to the modern principle of one-hole fixing, and the large control knob with which each is fitted allows the setting to be altered to a very fine degree, the absence of cut gears giving smooth movement.

Novel Scissors and Knife.

A pair of scissors which should be useful to those who delight in assembling radio apparatus at home has been patented by MESSRS. CHRISTOPHER JOHNSON & CO., of Sheffield. The device should enable components to be mounted without the use of any other appliances, for it combines a universal spanner for round and hexagon nuts; bent shanks, which keep the fingers clear of the panel and enable nuts to be gripped in parts difficult of access; bevelled edge sharpened for cutting rubber insulation and scraping enamel or cotton covering off wire; strong scissors for cutting tape, &c.; wire cutter; a deep-cut file on the back for sawing and a finely-cut file on the side; and a screw driver. The scissors are 4½ in. long.

A somewhat similar tool, but in the form of a hand-made pocket knife, is marketed by GEO. IBBERTSON & CO. This Sheffield product has a hand-forged steel blade, which is relieved of work it should not be made to do by the provision of a tool that serves as a screw driver. The flat under side and one of the bevels are file cut, while the other plain bevel is ground to an edge suitable for wire scraping and has a notch for the removal of insulation. At the opposite end to the blade is a pair of wire cutters.

Legal.

Theft of Electricity.

AT the Eccles Police Court on March 22nd, Thomas Henry Willcocks, Eccles, was summoned for fraudulently abstracting electricity from the Corporation's mains. For the prosecution it was stated that the defendant's installation was supposed to consist of 80-W lamps, and he was charged on that basis. A Corporation inspector found that the defendant had substituted 100-W lamps and had tampered with a current limiter, putting it out of circuit. Defendant stated that he knew nothing at all about electricity. One night the lights went out, and he undid the seal of the limiter and fastened some wires inside.

A fine of 40s. was imposed.

British Thomson-Houston Co., Ltd., v. W. A. Tunstall, Ltd.

IN the Chancery Division on March 23rd, before Mr. Justice Lawrence, Mr. Trevor Watson mentioned the motion against the defendants, trading as the Novelty Co., in which his Lordship had granted an *ex parte* injunction, restraining the defendants from infringing the plaintiffs' lamp patents.

Mr. WATSON said that it was a case in which the defendant company, a limited company, was apparently trading under a name other than its own.

Counsel for the defendants said that there was an affidavit from the liquidator of the company, who was pendant to the action, and another by Mr. Wm. Alexander Tunstall. The affidavit of the liquidator explained that immediately the defendant company went into liquidation, the premises and business at 311, Gray's Inn Road, formerly belonging to the defendant company, were taken over by Mr. Tunstall in his own name and he had been trading as the Novelty Co. The defendant company was registered as the proprietary of the business carried on as the Novelty Co., and since it went into liquidation it had been the practice to strike out its name on the stationery. The affidavit of Mr. W. A. Tunstall stated that he formerly carried on business at Hornsey as the Novelty Co., a registered name. The defendant company was incorporated in February, 1922, and registered as the proprietary of the business carried on by the Novelty Co. When it went into liquidation he took over the premises, trading as the Novelty Co. in his own name.

Mr. TREVOR WATSON suggested that the writ should be amended by adding Mr. Tunstall as defendant.

His LORDSHIP said that Mr. Tunstall was willing to give an undertaking.

Counsel for the defendants observed that they might take the writ as amended, and he would undertake to enter an appearance for Mr. Tunstall.

His LORDSHIP instructed the defendants to give an undertaking not to sell or deal in the lamps until judgment or further order, costs to be costs in the cause.

Theft Charge.

AT the Old Street Police Court on March 26th, Walter Fredk. Crispe, 31, traveller, of Mitcham, was charged, on remand, that being bailee of £6 15s. 9d., the moneys of John Eastwick, radio manufacturer, 118, Bunhill Row, E.C., he fraudulently converted it to his own use and benefit. Detective-sergt. Weir said defendant pleaded guilty when previously before the Court and there was a remand that there might be communication with respect to another case. He (the officer) had received a message to the effect that the trader in question did not want to proceed with it. Mr. Snell said that he would remand the defendant in custody for a further week. If he then heard a good report of defendant, he would let him go.

Business Notes.

Commercial and Industrial Developments, Business Changes, Trade Opportunities, New Publicity Literature, Liquidations and Failures.

Strike Averted at Birmingham.—On March 23rd, the Salaries, Wages and Labour Committee of the Birmingham Corporation considered the application of electrical fitters in the Gas and Tramway Departments for the raising of their wages to the level of those paid to fitters in the Electric Supply Department. The Committee decided to accede to the demand, and the men accordingly withdrew the strike notice which they had given.

E.D.A. Activities.—A short time ago it was announced that the Electric Vehicle Committee of Great Britain had been reconstituted under the auspices of the British Electrical Development Association. We have now received from the latter body three illustrated pamphlets in which the advantages of the electric vehicle are put forward in an interesting way. Three applications of the vehicle are dealt with, *viz.*, for electricity supply undertakings, for refuse collection, and for delivery purposes. Emphasis is laid upon the lack of noise and odour, the ease of control, the economy and the cheapness of maintenance of the electric vehicle.

Overseas Orders for British Firms.—Among recent contracts secured by members of the British Engineers' Association are the following:—Messrs. W. H. Allen, Sons & Co., Ltd.—Pumping machinery for the main drainage of Cairo, including electrical plant; International Electrolytic Plant Co., Ltd.—Plant for the production of hydrogen and oxygen for France and America; Messrs. Petters, Ltd.—Engines for installations supplied by the British General Electric Co., Ltd., South Africa; the Anderson Grice Co., Ltd.—Four-motor electric locomotive cranes for New Zealand; Messrs. Bruce Peebles & Co., Ltd.—Two 7,500-kW alternators for the Lake Coleridge hydro-electric scheme, New Zealand; and Alloy Welding Processes, Ltd.—Three two-operator arc-welding machines for the Eastern Bengal Railway.

Wages in the Engineering Industry.—A conference was held in London on March 24th in connection with the application of the engineering trade unions in the London area for an increase of 20s. per week in the wages of their members. After a discussion lasting seven hours no agreement was arrived at, and the matter will now be referred to the central conference.

Chinese Tariff Increases.—The Chinese authorities at Peking have put forward a list of proposed surtaxes on foreign imports ranging from 2½ to 27½ per cent. *ad valorem*. In Class E, in which goods are subject to a 7½ per cent. surtax, the following items appear:—Electric wires, cables, switches, roses, cleats, batteries, transformers, motors, and materials of all kinds not otherwise specified, except dynamos and motors (*sic*); and telegraph and telephone materials of all kinds. Class D, subject to 12½ per cent. surtax, includes electric lamps and lampware, shades, pendants, brackets; fans and accessories; electric cookers, toasters, radiators, irons and similar electrical appliances.

Lead.—Messrs. James Forster & Co., reporting on March 27th, stated that the fresh fall in prices had put a check to any small improvement in demand, and consumers had practically withdrawn from the market. As little influential support was forthcoming, it seemed likely that the price would go to an even lower level until the restoration of confidence. "On the other hand, the position is not without some bright spots. There is a vast amount of buying to be done by consumers, particularly cable makers, few of whom have bought their supplies further than a few weeks ahead. Moreover, there is a better demand in Germany, and the lower prices in London will serve as a check to further selling of lead for forward delivery."

The American Radio Industry.—According to an American trade paper, quoted by the *Wireless Trader*, the radio industry of the United States is in a chaotic condition owing to over-production. One of the leading firms of radio manufacturers produced 300,000 multi-valve receiving sets during 1925 which remain unsold, and other firms find themselves in a similar position. As a result of this the prices of sets have been cut to ridiculous figures; multi-valve sets have been sold at as low as $10. In one liquidation it is estimated that the liabilities must have been well over a million dollars. The valve industry is also in difficulties through excessive production and there again the prices have fallen to very low levels in many instances. Our contemporary thinks that there may be an endeavour to unload a large amount of apparatus upon the British market.

Japanese Tariff Revision.—The import duties on certain plant and machinery will be increased if the new Japanese Tariff Bill is passed into law. Among the articles affected are boilers, gas and oil engines, water turbines and Pelton wheels, and dynamos and other electrical machinery.

Timber Trade Report.—Our Timber Trade Correspondent reports that the country is still well stocked with general construction woods from the North of Europe, and although the market is fairly firm, there is considerable competition for inquiries. In forward business the market has been dull of late. There is, however, sufficiency of timber to come forward, mainly of Finnish, Swedish, and Russian origin, so there need be no anxiety regarding spring and summer supplies. In the hardwood trade, mahogany logs are still a disappointing market so far as the poorer qualities are concerned, although there is a satisfactory call for the better varieties. Mahogany boards and planks are firm, as also are ebony and the choice woods, such as rosewood and satinwood. In American lumber, *i.e.*, ash, oak, walnut, satin-walnut, and other varieties, the high views of shippers for forward business are having the effect of keeping the United Kingdom market firm, notwithstanding large supplies in this country. The pole market is firming up a little, which should help holders of such stocks in this country.

Australian Electrical Industry.—An article in the *Sydney Daily Guardian* for February 12th quotes a number of statements from the presidential address delivered by Mr. G. A. Julius, B.Sc., to the Institution of Engineers at Hobart. After comparing Australian and American wages and giving other statistics, it is stated that to the Protectionist the figures seem to suggest that Australian manufacture needs tariff encouragement, to help it forward to the efficiency of the U.S.A.; but Mr. Julius argued a case against the imposition of tariffs to help smaller industries, and especially against electrical apparatus works. Setting out his case against duties on electrical apparatus, Mr. Julius claimed that the duty paid in 1923-24 was £859,000 to help 3,641 employés earning £174 each, and producing an "added value" of £243 each. The duty was about £236 an employé. Mr. Julius thought the taxation too high for the result. His argument is that these duties (1) have, by high prices, discouraged power equipment; and (2) have impeded the use of electric labour-saving devices. "The present method of extending assistance to electrical manufacturers through the tariff has failed," says Mr. Julius. His remedy is to take the tariff away altogether; not to increase it, in the hope of making electrical apparatus more efficiently in the Commonwealth.

For Sale.—Nottingham Corporation electricity department has for disposal 16 Lancashire boilers, 19 steam dynamos, 4 Weir feed pumps, 3 Berryman feed-water heaters, 2 Green's economisers, steam, exhaust, and feed-water pipes and valves. Hull Corporation Electricity Department has for disposal surplus generating plant. Sutton Coldfield electricity department has for sale one 150-kW steam balancer set, complete with control panels, &c. (See our advertisement pages to-day.)

Trade Announcements.—MESSRS. CARTER LEE & Co. have removed to larger premises at 42, Finsbury Square, London, E.C.2. A priced leaflet of their "Cyldon" variable condenser has been received.

MESSRS. LINDLEY, DUFFIELD & Co., LTD., of Brassington, Wirksworth, have removed their London office to 11, Aldwych, W.C.2. Telephone No.: "Gerrard 6753."

THE LIVERPOOL ELECTRIC CABLE CO., LTD., has opened a city office and stores at 63, Moorfields, Liverpool, where stocks of v.i.r. wires, cables, and flexibles are available, as well as at its works in Bootle. The telephone number of the new office is "Bank 5782."

MESSRS. JOHN RICHARDS & Co., LTD., electrical engineers, of Burton-on-Trent and London, have opened a branch business at 22, Bore Street, Lichfield.

MR. BEN CROSLAND (trading as Crosland & Bateson), electrical contractor and armature winder, Heckmondwike, has opened a new showroom at 85, Bradford Road, Batley.

YESLY ELECTRICAL SUPPLIES, LTD., of 5a, Iliffe Yard, Crampton Street, London, S.E.11, has been registered to continue the personal trade connection of its managing director, who was with Engineering Supplies, Ltd., and Shenton and Co. Catalogues are asked for.

MR. A. S. TONG, Newcastle branch manager of the Foster Engineering Co., Ltd., has taken over the firm's transformer business for the northern area, which, until recently, has been handled by Messrs. Lindsay & Ward.

MESSRS. FERNAND ESPIR have removed to 86 and 88, Queen Victoria Street, London, E.C.4. New telephone Nos.: "Central 2492 and 2493."

The METROPOLITAN RADIO COMPANY has opened a retail wireless store at Dominion Buildings, Drake Circus, Plymouth.

Messrs. ED. BENNIS & Co., LTD., announce that Mr. J. G. McLean is no longer their representative on the North-East Coast and Sheffield and district areas. They ask that until a new appointment is made communications shall be addressed to the head office, Little Hulton, Bolton.

Catalogues and Lists.—MR. PERCY PITMAN, 25, Victoria Street, London, S.W.1.—Leaflet describing a new hydraulic governor.

MESSRS. FREDERICK BRABY & Co., LTD., Glasgow.—A series of pamphlets dealing with various forms of steelwork—for buildings, barrows, staircases, &c.

THE IRON & NICKEL BATTERY CO., LTD., 17-19, Cockspur Street, Pall Mall, S.W.1.—A leaflet describing "Ionic" batteries for yacht lighting.

MESSRS. ROBERT MCGREGOR & Co., Alpine Steelworks, East Molesey.—A blue print illustrating twenty types of cable hangers and racks.

MESSRS. HOUGHTON-BUTCHER (GREAT BRITAIN), LTD., 88-89, High Holborn, W.C.1.—A series of pamphlets advertising the company's radio service.

THE CARPAX CO., LTD., 312, Deansgate, Manchester.—A priced and illustrated folder advertising "Homcharger" battery chargers.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester.—"Service to the Textile Industry"—a brochure (1,874/1) dealing with steam and electric drives for textile works.

MR. E. J. BATY, 157, Dunstable Road, Luton.—A card advertising radio service and a number of devices.

BROOKHIRST SWITCHGEAR, LTD., Northgate Works, Chester.—Calendar cards for April, May and June, bearing illustrations of the company's control panels and starters.

MESSRS. GEORGE GREEN & Co., 40, Aybrook Street, Manchester Square, W.1.—An illustrated price list of electrical calorifiers, bath-water heaters, and storage geysers.

DIXONIA, LTD., 4, Portsmouth Street, Kingsway, W.C.2.—A priced and illustrated catalogue of automobile accessories.

MR. L. J. WOLF, 116, Putney Bridge Road, S.W.15.—A folder advertising Robbins & Myers fractional horse-power motors.

MESSRS. GENT & Co., LTD., Faraday Works, Leicester.—A well-illustrated and priced catalogue (Book 2) of telephones and accessories for offices, institutes, and factories.

Bankruptcy Proceedings.—W. S. MILES, "Roslyn," Worston Road, Burnham-on-Sea, Somerset, radio engineer.—The receiving order in this matter was made on March 12th on debtor's own petition. The statement of affairs shows liabilities of £761, against assets of £43, or a deficiency of £718. Debtor states that on June 8th, 1925, he commenced business at Lynton Road, Burnham-on-Sea, as a wireless instrument dealer with a capital of £50, but was only able to make a bare living. Debtor did not at any time take any steps to ascertain his financial position, but admits that he became aware of his position in 1923, when he gave a former partner a promissory note for £600.

First meeting, March 31st at the Official Receiver's office, 26, Baldwin Street, Bristol. Public examination, April 12th, at the County Court Offices, Bridgwater.

C. HUBBARD, electrician, 13, Magdalen Street, Norwich.—Receiving order made March 19th on debtor's own petition.

J. A. A. BARDSLEY, electrical contractor, 91, Old Hall Lane, Withington, Manchester.—First meeting March 30th at the Official Receiver's offices, Byrom Street, Manchester. Public examination April 30th, at the Court House, Manchester.

B. G. THOMPKINS, radio engineer, Armstrong's Buildings, Stanley, Durham. First meeting April 1st, at the Official Receiver's office, Pearl Buildings, 4, Northumberland Street, Newcastle-on-Tyne. Public examination April 15th, at the Court House, Newcastle-on-Tyne.

A. MCNEILL (A. McNeill & Co.), electrician, Oakfield Chambers, Motherwell.—The estates of the above debtor were sequestrated by the Sheriff of Lanarkshire on March 23rd. A meeting to elect the trustee and commissioners will be held on April 6th at County Buildings, Hamilton. Agent, Mr. J. K. Murray, solicitor, Motherwell.

J. C. HEALY, electrical engineer, 4, Worsley Terrace, Wigan.—Receiving order made March 26th on debtor's own petition.

M. D. ROSENBLOOM (D. Rose & Co.), electrical engineer, 25, Osborn Street, E.—Application for discharge to be heard April 20th at Carey Street, W.C.

R. HAWORTH, electrical engineer, 154, Duckworth Street, Darwen.—Last day for proofs for dividend April 9th. Trustee, Mr. H. Parker, Official Receiver, 11, Winckley Square, Preston.

Company Liquidations.—PRICE'S BATTERY AND RADIO CO., LTD., 11, Hart Street, New Oxford Street, W.—A meeting of creditors was held on March 23rd at the Charing Cross Hotel, W.C., when Miss E. Watts, who had been appointed to act as the liquidator in the voluntary liquidation, presided. The liquidator reported that the unsecured liabilities amounted to £5,258, and the assets, after deducting preferential claims, to £1,472, leaving a deficiency of £3,786. It was stated that the company was formed in 1924 to take over the business of Alexander Price & Co., which had been established for some twelve years. The company acquired the sole exclusive rights to use certain patents belonging to Mr. Price. The authorised capital of the company was £5,000, of which £3,001 had been issued. The company started trading as manufacturers of batteries, accumulators, &c., but after a time it was decided to expand the business by undertaking the manufacture of radio apparatus. The company did a fairly good trade for some six months, and it was decided to issue further shares, bringing the total issued capital up to £4,500. The present position of the company was attributed to heavy advertising and to expenses incurred in perfecting a patent condenser. For the purposes of the statement of affairs no value had been placed upon the patent in question. The company paid nothing for the patent, but agreed to pay a royalty of one penny on every condenser sold, and acquired the British rights. A balance sheet at June 30th, 1925, showed a balance on the profit and loss account of £1,747. At that time the stock stood in the books at £1,140. The goodwill was valued at £2,770, and trade creditors £1,300. There was also an ovedraft at the bank of £2,133, which had subsequently been paid off by Mr. Agar, who now claimed against the estate. A resolution was passed confirming the voluntary liquidation of the company, with Miss E. Watts as liquidator, and an advisory committee was appointed consisting of Mr. Haines, the representative of Messrs. V. C. Bond, and Mr. W. Baker, representing creditors. The following are creditors:—

	£		£
Haines, H. E.	278	Sun Electrical Co., Ltd. ...	24
Bond, V. C.	135	Lytton's Machine Tool Co. ...	25
Fuller's United Electric Works, Ltd.	125	Metropolitan Electric Supply Co., Ltd.	30
Olver, J. V.	57	Chloride Electrical Storage Co., Ltd.	22
Graham, A.	35	Agar, M. F.	3,385
Burton, B. C.	34	Stones, —.	76
Gardner & Sons, H.	22	Price, —.	427
Rick, F. W., & Co., Ltd. ...	41		
Iliffe & Sons	26		

DOMESTIC & GENERAL ELECTRICAL CO., LTD.—Winding up voluntarily. Liquidator, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C. Meeting of creditors April 7th, at the Liquidator's offices. Particulars of claims to the Liquidator by April 28th.

BRITISH WIRELESS SUPPLY CO. (1924), LTD.—Winding up voluntarily. Liquidator, Mr. G. S. Smith, 17, Piccadilly, Bradford. Meeting of creditors held March 31st, at Leeds.

Napier Kimber, Ltd.—A meeting of members is called for April 26th, at 24, Basinghall Street, E.C., to hear an account of the winding up from the Liquidator, Mr. S. H. Gillett.

P.S. Wireless Manufacturing Co., Ltd.—A meeting of members is called for April 28th, at 34, Grand Parade, Brighton, to hear an account of the winding up from the Liquidator, Mr. E. Webb.

Private Arrangements.—H. E. Leigh and R. W. Leigh, trading as Leigh Bros., 290a, St. Paul's Road, Highbury, N., manufacturers of radio apparatus.—A meeting of creditors was held on March 22nd, when the chair was taken by the representative of Mr. H. S. Wright, one of the largest creditors. The debtors presented a statement of affairs which disclosed liabilities of £783 and assets of £628, leaving a deficiency of £155. The debtors stated that they started trading in November, 1922, with a small capital. In 1923 the turnover was £5,682, and there was a net profit of £618. In the following year the turnover was £8,340, and the net profit of £637. In May, 1925, Mr. H. S. Wright, who made up a large proportion of the debtors' components, fell ill, and left the country. The debtors then took a workshop in St. Paul's Road and started to manufacture. After May, 1925, a slump occurred in the wireless trade, and the turnover fell considerably, and the debtors were unable to clear off certain liabilities. A resolution was passed agreeing to accept an offer of a composition of 6s. 8d. in the £, payable as to 5s. on April 1st and a further 1s. 8d. in the £ in three months, suitably guaranteed to the satisfaction of a committee of inspection consisting of Mr. E. Fleury, Mr. O'Callagan, and Mr. C. Latham, representing creditors.

Trade with Cuba.—A recent report by Mr. M. H. C. Kelham, Acting British Consul-General at Havana, upon economic conditions in Cuba (Stationery Office, 1s. net), states that although trade between Great Britain and Cuba has shown a steady increase during the past two years, British trade has probably suffered more than that of any other country from local depression. United States and German goods often obtain preference owing to the very low, and in some cases uncompetitive prices offered. There is still in Cuba a willingness to purchase from the United Kingdom, but in spite of this British firms are still encountering many difficulties through delays in delivery, heavier Customs duties, &c.

Reduced Polish Duties on Machinery.—The Minister of Finance has been authorised to make a reduction of 90 per cent. in the import duty on machinery and apparatus not manufactured in Poland and destined for the equipment of new industrial establishments. Since this large reduction is intended to facilitate the equipment of factories on the most modern lines, it will not apply to machinery of old patterns.—*Reuter's Trade Service* (Warsaw).

Proposed Swedish Tariff Reduction.—The Norwegian Government has under consideration a revision of the customs tariff and among the proposals is one that the duty on electric cables and insulators shall be reduced from 35 to 30 öre per kg.

New Electrical Firms.—The following new electrical businesses have recently been started:—

R. Herbert & Co. (radio manufacturers and wholesalers), Horley, Surrey.

The R.B. Sales Co. (radio engineers), London Terminal Aerodrome, Croydon, Surrey.

The Brecknock Wireless Stores (wireless trading), 177, York Road, N.7.

The Cleartron Northern Sales Co. (wireless valves and accessories), 66, Market Street, Manchester.

The Voltron Co. (merchants of wireless), 75, City Road, London, E.C.1.

The Key Manufacturing Co. (radio components and repetition work), 29, Old Compton Street, W.1.

M. Forbes & Dunlop (radio and electrical apparatus), Skaelkmuir Mill, Canon, Falkirk.

E. Lee & Son (cycle and radio engineers), 8, North Street, Gosport, Hants.

The Sulfeta Co. (accumulator acids), 11, Hopwood Gardens, Tunbridge Wells.

H. Page & Sons (electrical engineers and contractors), 70, Wool Exchange, Coleman Street, E.C.

Kimber & Son (electrical engineers), 81, Whitehorse Road, Croydon.

The West (Greenwich) Trading Co. (wireless trading), 78, South Street, Greenwich.

G. Gordon & Co. (electrical and mechanical engineers), 114, Alexandra Parade, Glasgow, E.

The Nelson Electric Co. (electrical engineers and contractors), 26, Bignor Street, Cheetham Hill, Manchester.

The Grange Electric Co. (sale of electrical accessories), Grange Street, Keighley.

The Wireless Repair Depot (repairing wireless accessories), 39, Bethlehem Street, Grimsby.

C. Lindop & Co. (electrical and mechanical engineers), 8, Lower Breck Road, Liverpool.

New Belgian Company.—A new company has lately been formed at Schaerbeek, Brussels, with a capital of 250,000 fr., and the title La Société Belge pour l'Equipement Electrique pour Véhicules.

New Municipal Showroom and Offices.—The showroom and offices of Blackburn Electricity Department in Queen Street, Great Harwood, were opened by Councillor A. Slater, J.P., chairman of the Council, on March 25th.

Chinese Notes.—A recent issue of the *Chinese Economic Bulletin* gave details of the three tramway systems working in Shanghai, those of the Shanghai Electric Construction Co., Ltd., the Cie. Française de Tramways et d'Eclairage Electriques de Changhai, and the Chinese Electric Power Co., Ltd. These three systems cover the main business and residential sections of the city, except the Chinese district of Chapei. Some months ago the Shanghai-Paoshan Tramway Co., Ltd., was organised by a number of Chinese to start a line in the densely-populated Chapei district.

A Shanghai correspondent reports that the Chapei Waterworks & Electricity Co., Ltd., has a bulk supply agreement with the Shanghai Municipal Electricity Department. This expires in 1930, and the company then proposes to install its own plant, consisting of two 4,000-kVA turbo-generators, together with the necessary boiler plant and switchgear. It is probable that long-term credit will be required for payment.

New Cable Company in Czecho-Slovakia.—The Krizik company of Prague, the Bratislava cable works, and the Kablo company, of Kladno, are forming a joint stock company for the manufacture of long-distance cables. The company will have a capital of 1,200,000 crowns.—*Reuter's Trade Service* (Prague).

Local Exhibition.—Bridlington.—The Council's electrical engineer (Mr. A. J. Beckett) informs us that as a result of a week's exhibition at Bridlington, nine of the leading electrical companies have sold 150 cookers and washers, apart from other appliances. Among the concerns which exhibited and demonstrated apparatus were Metro-Vick Supplies, Ltd., the General

Electrical Exhibition at Bridlington.

Electric Co., Ltd., the Edison Swan Electric Co., Ltd., the Jackson Electric Stove Co., Ltd., the Cable Accessories Co., Ltd., Siemens and English Electric Lamp Co., Ltd., Messrs. Moorwoods Ltd., the Credenda Conduits Co., Ltd., and the Hurley Machine Co. The stands of some of these firms are shown in the accompanying illustration.

Threatened Tramway Strike.—At the end of last week the employés of the Rochdale Corporation tramways gave notice of their intention to cease work to-day (Friday) on account of the dismissal of two men for misconduct.

Social Events.—The social clubs of W. T. Henley's Telegraph Works Co., Ltd., and Henley's Tyre & Rubber Co., Ltd., held their annual dinner at the Florence Restaurant, W., on March 20th. Mr. P. Rosling presided in the absence, through illness, of Mr. W. J. Potter. Sir George Sutton sent a telegram regretting his inability to attend. The speeches were brief and witty, and an excellent concert was provided by two members of the staff (Messrs. H. Stanley and J. N. Tinniswood) and a number of professional entertainers.

A dinner was given to their staff by Messrs. E. J. Strange and Sons, Tunbridge Wells, on March 19th, to celebrate the firm's centenary, it having been established in 1824. The firm organised an electrical branch (now Strange & Sons Electrical Engineering Co., Ltd.) twenty-five years ago. We have received a souvenir booklet prepared for the occasion of the centenary.

The third annual staff dinner of the Automatic Telephone Manufacturing Co., Ltd., was held on March 19th, at the Exchange Hotel, Liverpool. Sir Alexander Roger, chairman of the company, presided over an assembly numbering about 150, representative of all sections of the company's Liverpool and London personnel. The toast of the evening, "The Company," was proposed by Mr. W. P. Horsburgh, F.R.I.B.A. In responding, the chairman referred at some length to the progress of the undertaking, its growth and varied interests. He paid tribute to the untiring efforts of the staff. It was announced that the manager of the company, Mr. G. W. Moore, had been appointed to the board of the International Automatic Telephone Co., Ltd. An excellent musical programme was furnished under the direction of Mr. Wilfred Bird, L.R.A.M.

The staff of the Siemens concerns held a dance at Slater's, Oxford Street, W.1, on March 26th. About 200 people attended.

Australian Tariff Decision.—Among the recent decisions of the Australian Customs Board is the following:—Coal-cutting machines: Free under the British preferential tariff; 5 per cent. under the intermediate tariff; and 10 per cent. under the general tariff.

Indian Electrical Imports.—The *Board of Trade Journal* for March 25th contained a review of India's import trade during the first nine months of the current fiscal year (April-December, 1925). This shows that Great Britain maintained her lead as the principal supplier of electrical machinery. The total value of imports under this heading was 146¾ lakhs of rupees, as compared with 139 lakhs in the corresponding period of 1924.

Book Notices.—The *Decimal Educator* for March (price 6d.) reports the progress towards complete reform in weights and measures which is being made by the countries which have most recently adopted the metric system, and gives many instances of the disadvantages to this country which are incurred by its adherence to out-of-date systems. It also gives extracts from an American publication showing the steps which are being taken by that country towards the adoption of the metric system.

"The Colliery Year Book and Coal Trades Directory, 1926." Pp. 100+1,024. London: The Louis Cassier Co., Ltd. Price £1 1s. net.—The fourth edition of this work contains a complete list of all the colliery owners of Great Britain, shows the number of men employed at each colliery, and gives particulars such as the constitution of the companies, their boards of directors, &c. Over a hundred pages of the book are devoted to statistics covering every phase of coal production and distribution, and a table shows the analysed costs of distribution in London and the provinces. The publication also contains a "Who's Who" of the leading men in the industry.

The Spring List published by Sir Isaac Pitman & Sons, Ltd., includes the titles of books on electrical engineering and technology, economics, chemistry, physics, and many other subjects.

"Science Abstracts" (A and B). Vol. XXIX, Part 3. March 25th, 1926. London: E. & F. N. Spon, Ltd. Price 3s. each.

"Commission Internationale de L'Eclairage—sixième session." London: Cambridge University Press. Price 15s. net.

"*Journal* of the American Institute of Electrical Engineers." Vol. XLV. March, 1926. No. 3. New York: The Institute. Price $1.

New Australian Company.—Measurement (Australia), Ltd., was recently registered in Sydney, with a capital of £25,000, to acquire the Australian branch of Measurement, Ltd., and to carry on the business of manufacturers of meters for measuring the flow of water and other liquids and electricity.

Elma Illumination Design Course.—At the conclusion of the eighth illumination design course held in London at the Lighting Service Bureau, from March 23rd to 26th, which was attended by many representatives of electricity supply authorities, the "students" were entertained to dinner at Carr's Restaurant by Elma. In the unavoidable absence of Mr. C. H. Cox, Mr. C. W. Sully, director of Elma, occupied the chair, and expressed the regret of the staff that Mr. W. E. Bush was prevented by illness from taking part in the course. Referring to the questions at issue between some supply authorities and some electrical contractors, he urged that they should work together in harmonious co-operation. Mr. E. W. Jones said they were all agreed that the course had been both instructive and thoroughly enjoyable, and expressed their deep appreciation of the kindly treatment they had received. Mr. A. L. Johnson, proposing the health of the staff, said they had all given of their best, and Mr. Horner (Leatherhead) cordially endorsed his eulogy. Mr. W. J. Jones responded, thanking all for the kind spirit that had prevailed throughout the course. Mr. L. E. Buckell asked for suggestions from salesmen in particular for the improvement of the course for their benefit, and remarked on the extraordinary enthusiasm of the students. Amongst other speakers, Mr. Holmes (chairman of the Sales Committee of Elma) said he was impressed by the close attention given to the lectures, Mr. Hughes (Glasgow), and Mr. Evans (Newcastle) testified to the excellent results they had obtained by popular lectures at many provincial towns, and Mr. Sully, paying a tribute to the organiser of the course, Mr. R. C. Hawkins, said that the Bureau was willing to assist undertakings to open bureaux in the provinces, to be maintained by those locally interested in the industry. An excellent entertainment was provided and was thoroughly enjoyed.

The German Electrical Industry.—The report of the Siemens-Schuckert Works Company states that the revival in the home market which was mentioned in the report for 1923-24, continued until almost the end of 1924-25. The invoiced turnover in 1924-25 was materially higher than in the previous year, which in turn surpassed the turnover of the last pre-war year, considered in volume; measured in prices, it was about one-third higher than the latter. It was necessary to increase by over 30 per cent. the number of workers as compared with 1913 in order to deal with the increased turnover. Thanks to the far-reaching foreign organisation, it was possible for the company to secure a good share of foreign orders. The German iron and steel industry was very reserved in the allocation of orders, but business with public supply undertakings was more active. Special reference is made to the securing of the contract for the harnessing of the Shannon.

The report of the Siemens & Halske Company, dealing with the year ended with last September, states that the amount of the net profits is considered unsatisfactory seeing that the works were abundantly occupied during the whole of the year. Further work was carried out in the direction of reducing the number of types of manufactures and the development of mass production. The advantages resulting from these methods operated for the most part during the whole of the year, but they were insufficient to counterbalance the effect of the increased burdens and the large advances in wages and salaries. The business received was abundant, so that the orders in hand at the commencement of the new financial year showed an increase. Particular activity was manifested in the telephone branch for the extension and improvement of existing installations, but the prices realised in various branches were insufficient, especially for foreign orders owing to increased duties and the preference given to native manufactures. Down to the end of the year business in telephone cables was also satisfactory. The company has participated in the development of broadcasting with the Telefunken Company. There was again a scarcity of orders in the railway signalling branch. After referring to the extension of interests in the department of medical electricity, the report states that business in electric furnaces again improved, that the Vienna works were well employed and that a branch factory has been established in Milan.

Great German Steel Trust.—The shareholders of five leading German steel-producing companies are being asked to approve an amalgamation of their interests in the Vereinigte Stahlwerke A.G. The new trust's capital will amount to 800 million marks (£40,000,000), and the companies participating and the amount of their holdings are as follows:—The Rhein-Elbe Union, 39.5 per cent.; Thyssen, 26 per cent.; the Phœnix, 23.65 per cent.; the Rheinstahl, 8.5 per cent.; and the Van der Zypen, 2.35 per cent. The bulk of the capital of the last concern is held by the Phœnix company.

Electrical Machinery for Argentina.—Our correspondent in Buenos Aires says that extensions and re-equipment of the new port are proceeding and offer a favourable opportunity for British manufacturers. A number of steam and hydraulic cranes are being converted, and the machinery already, or to be supplied includes movable electric cranes, fixed cranes, and electric wall cranes. The port is provided with an electric generating plant. There is also scope in the provinces for the introduction of electrical plant and machinery in sugar factories. Many of the sugar manufacturers would give favourable consideration to any proposal for substituting electricity for steam or hydraulic power in the larger mills. Already, where electrical power has been introduced, the production efficiency has been greatly increased. In one case the introduction of electric plant was effected nearly twelve years ago. A 260-kVA vertical steam-engine driven generator furnishes the power, which is used to operate some fourteen enclosed motors varying in size from 10 to 15 h.p.

The Industrial Alliance.—By 70,695 votes to 31,423 the Amalgamated Engineering Union has decided to join the proposed "Industrial Alliance," which now embraces seven trade unions, with a membership of over 1,600,000, including the Electrical Trades Union. These unions have agreed to render assistance to one another in industrial disputes. The form which the assistance will take ranges from help in negotiations, through financial support, to complete "sympathetic" action.

Unemployment.—The figures relating to unemployment for the week ended March 15th showed that the decrease is still continuing. The total at that date was 1,070,800, as compared with about 1,094,000 a week earlier. The reduction during the preceding twelve months was 148,400.

Lighting and Power Notes.

Bexhill.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to a loan of £6,500 for feeders and distributing mains.

Brighton.—ELECTRICITY IN BULK.—The Electricity Committee has arranged terms with the promoters of the Hassocks and Hurstpierpoint electricity supply scheme with regard to the terms upon which a bulk supply might be furnished to the company from the Preston Park sub-station. To afford this bulk supply it will be necessary to extend the e.h.p. feeder from Preston Park sub-station to a point in or near Patcham, where a suitable position for housing the switchgear for interconnecting and metering the supply can be arranged for. The cost of the mains is estimated at £4,850.

Canada. — WATER-POWER RESOURCES.—The Dominion Water-Power Branch of the Department of the Interior at Ottawa has issued a review of the water-power resources of Canada, dated January 1st, 1926, in which it is stated that the known available water power in Canada, from all sources, is 18,255,000 h.p. for conditions of ordinary minimum flow, and 32,076,000 h.p. ordinarily available for six months of the year. A study of the uses to which the water-power installation is put shows that the 4,290,428 h.p. at present installed throughout the Dominion is apportioned to the following uses:

—3,466,422 h.p. in central stations for general distribution for domestic, municipal, and commercial lighting and power purposes; 481,971 h.p. in 116 pulp and paper mills (in addition, pulp and paper mills purchase about 275,000 h.p. from central stations, making a total of nearly 757,000 h.p. used in the manufacture of pulp and paper); 342,035 h.p. installed in industries other than central stations and pulp and paper mills. The total installation for the Dominion averages 465 h.p. per 1,000 of population, a figure which places Canada among the leading countries of the world in *per capita* utilisation of water power. The capital invested in water-power developments is estimated to amount to $815,723,890.

Electrical Development.—The Canada Northern Power Co. has decided to commence work on a transmission line from the Des Quinze plant to Rouyn, Quebec. Not only will the new line assure about 10,000 h.p., but the power site at Des Quinze lends itself to a big increase in power development at any time such construction is required.

Cheadle and Gatley.—Electricity Charges.—The Urban District Council has fixed the charge for electricity for heating, cooking, and domestic appliances to ordinary consumers at 1½d. per kWh during the summer quarters, and 2d. per kWh during the winter quarters.

Chirk.—Electricity in Small Houses.—The Rural District Council has appointed a special sub-committee to interview the Chirk Electricity Supply Co., Ltd., in connection with a proposal to install electric lighting in the Council houses at Rhosywaen.

Continental.—Belgium.—A new 10,000-kW turbo-alternator has recently been added to the power station at the collieries of the Société des Charbonnages de Marcinelle-Nord, bringing the capacity of the plant up to 15,500 kW.

The report of the Société de l'Electricité de l'Escaut of Antwerp for 1925 shows that during the past year the number of consumers increased from 19,081 to 24,087. Delays have occurred in connection with the erection of the 50,000-V transmission line between Merxem and Beerse to supply the northern and eastern sections of the province of Antwerp, but good progress is now being made, and it is expected that the line will be completed within a few weeks. Good progress has also been made with the electrification of the province of Limburg, in which there is now a distribution system supplying electricity to 191 communes. It is stated that there are now only 15 villages in the province without an electricity supply.

France.—La Société Lyonnaise des Eaux et de l'Eclairage has recently secured a concession for the supply of electricity in the Department of the Aube, Marne and Côte d'Or from its steam-operated station at Troyes and from hydro-electric stations at Beaulieu, Juvanze-sur-l'Aube, Autricourt, and Barberey-sur-la Seine.

Switzerland.—The Federal Council has authorised the drawing up of a report of all the hydro-electric stations in the country, the report to be ready by the end of April. At the same time, the Council has requested each canton to furnish a detailed annual statement concerning all the power-houses in its area, their annual yield, their use, &c. The object of these steps is to enable the country to be in a position to furnish every particular that may be asked for at the forthcoming International Exhibition of Hydraulic Forces to be opened at Bâle at the beginning of July, to put the Government in possession of the exact amount of h.p. and kW available for exportation after the country has been duly supplied with "white coal," and to put before the Federal authorities the surveyors' reports of every station with a view to their proper superintendence and taxing.

Coventry.—New Power Station.—The Electricity Committee is applying for consent to proceed with the first section of the new generating station at Longford, at an estimated cost of £559,000.

Ferryhill.—Electricity Supply.—The Cleveland and Durham Electric Power, Ltd., has under consideration a scheme for lighting the district, and proposes to canvass the business community and residents with a view to ascertaining the probable demand for electric lighting.

Gellygaer.—Loan.—The Urban District Council has applied for sanction to a loan of £5,115 for electricity purposes.

High Peak District (Derbyshire).—Electricity Supply.—Various proposals to provide the district with electricity have been advanced. The Power Development Co. has applied for an Order to enable it to sell electricity in the rural districts of Chapel-en-le-Frith and Disley, the urban district of Whalley Bridge, and the parish of Taxal. The electricity is to be purchased from Stockport Corporation and supplied to consumers from a sub-station at New Mills. The New Mills Council has applied for an Order to sell electricity in its own area, the energy to be purchased from Stockport, and distributed from a sub-station to be erected at New Mills. There would thus be two sub-stations taking electricity from one authority, but distributing it in separate areas. A conference of all the Councils concerned has been called to discuss the question of forming a joint board to undertake the supply of electricity to the whole area, the supply being taken from the Stockport Corporation.

Hornsey.—Electricity Extensions.—The Electricity Committee is to carry out the following extensions:—New l.p. feeder from the generating station to Crouch End Broadway, £3,000; extension of l.p. feeder in Stapleton Hall Road, £600; extension of l.p. feeder in Florence Road, £1,500.

Ilford.—Loans.—The Electricity Committee is to apply for sanction to the borrowing of £20,000 for mains and £20,000 for wiring installations.

Japan.—Electrical Development.—The Ina Douki K.K. has amalgamated with the Chuo Denka Koguo K.K., and has increased its capital from 15,000,000 yen to 20,000,000 yen. Application has been made to the Government for permission to erect a power station on the Koshibu River, where the Chuo company held a concession.

Kirkham.—Electricity in Bulk.—The Urban District Council has asked Preston Electricity Committee if it is prepared to give a bulk supply of electricity by tapping the proposed transmission line between Preston and Blackpool. The matter is being considered by a joint committee.

Lanarkshire.—Hospital Supply.—The Upper Ward District Committee of the County Council has arranged with the Clyde Valley Electrical Power Co. to supply electricity to the Roadmeetings Hospital for power and lighting at a flat rate of 2½d. per kWh, the Committee meeting the first cost of the cable and transformer house, estimated at £2,200.

London.—Battersea.—The Electricity Committee has recommended alterations and additions to the condensing water system at the generating station at a cost of £29,500.

Luton.—Loan Sanctioned.—The Electricity Committee has received sanction to the borrowing of £10,500 for mains and switchgear.

Padiham.—Electricity Supply.—At a meeting of the Urban District Council, on March 25th, a resolution, passed recently, that the Council should operate its own electricity Order was referred back. It was decided to prepare plans for a transformer station.

Palestine. — Electrical Development. — Power stations operated by fuel-oil engines have recently been completed at Haifa and Tiberias.

Plymouth.—Electricity Supply.—The Corporation Electricity Committee is applying for sanction to the borrowing of £75,000 for mains and services estimated to be required during the next three years. Cable extensions at a total estimated cost of £2,094 have been sanctioned. The Committee has accepted a tender at £29,000 for the supply of a new 7,500-kW turbo-alternator.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

Edinburgh.—Lighting: From 3½d. to 3¼d. per kWh.

Heston and Isleworth.—Power, heating, and cooking: From 2½d. to 2d. per kWh.

Launceston.—*Launceston and District Electric Supply Co., Ltd.*—Power: From 5d. to 4½d. per kWh. Heating: From 3d. to 2½d. per kWh.

Long Eaton.—Lighting: From 6½d. to 6d. per kWh. Power: From 2½d. to 2d. per kWh, with further reductions in the charges for heating and cooking and meter rentals.

Shipley.—Electricity in Bulk.—At a recent meeting of the Electricity Committee a letter was read from the Yorkshire Electric Power Co. with regard to the supply of electricity in bulk from the company's system. The Committee gave instructions for details of the proposals both for a partial and complete supply to be obtained and a full report prepared for consideration at a special meeting of the Committee to be arranged to consider this matter.

Silsden.—Inauguration of Supply.—The *Keighley News* reports that electricity was introduced at Silsden recently, a public supply for power purposes being provided from the mains of the Yorkshire Electric Power Co. The Company recently extended its mains from Ilkley to Addingham, and from Addingham they have been extended to Eastburn, at which point a connection is made with the Keighley-Skipton line. The Electricity Commissioners are still considering the competing applications for distributing powers deposited by the Keighley Corporation and Electrical Distribution of Yorkshire, Ltd.

Special Orders.—Applications have been made to the Electricity Commissioners for Special Orders by the following authorities:—The County of London Electric Supply Co., Ltd., for the supply of electricity in the urban district of Epping and certain parishes in the rural district of Epping; the Newcastle-upon-Tyne Electric Supply Co., Ltd., in the urban districts of Prudhoe and Rothbury, and parts of the rural districts of Hexham, Alnwick, and Rothbury; the Cleveland and Durham County Electric Power Co., within parts of the rural districts of Darlington, Hartlepool, Sedgefield, and Stockton.

St. Austell.—Electricity Supply.—In connection with the St. Austell Electric Lighting & Power Co.'s scheme for the erection of a power station at Pontswill, it is proposed to run h.p. cables from the station to St. Austell and Fowey, with subsidiary cables to districts *en route* where required.

Sunningwell.—INQUIRY DECISION.—As the outcome of an application to the Ministry of Transport, who recently held an inquiry, the Abingdon Electric Supply Co. has received consent to the erection of h.p. lines over property at the foot of Bayworth Hill for the transmission of electricity.

Thornton-le-Fylde.—ELECTRICITY CHARGES.—The scale of charges for electricity has been fixed at 7d. per kWh for the first 250 kWh, down to 5d. for over 1,000 kWh for lighting purposes; and for power, 3d. per kWh for the first 250 kWh down to 2d. for over 1,000 kWh.

Wigan.—NEW ELECTRICITY CHARGE.—The Town Council, in order to encourage the more general adoption of electricity for domestic purposes, has fixed the following alternative scale of charges for private houses:—An annual charge according to the rateable value of premises, plus ½d. per kWh for electricity consumed. The adoption of the new scale is contingent upon the installation of domestic appliances, other than lamps, in accordance with the following scale of rateable values:—Houses not exceeding £25 per annum, 2 kW minimum to be installed; from £25 to £40, 3 kW; exceeding £40, 4 kW.

Willesden.—LOAN SANCTIONED.—The Electricity Committee has received sanction to a loan of £25,000 for mains and services.

York.—ELECTRICITY EXTENSIONS.—The following items are included in the next year's estimates of the Corporation Electricity Committee:—One 6,000-kW generating set, £20,000; cables and services, £10,000; Linton hydro-electric station, £7,000; boiler and engine house, £7,000.

Tramway and Railway Notes.

Continental.—GERMANY.—The Frankfurt correspondent of *The Times* reports that negotiations for a loan of 46,200,000 marks by the State of Baden have recently been concluded. The money is to be used for financing and extending State enterprises, including the electricity supply station. Part of the loan will be used for the purpose of acquiring a share in a large Rhine power works, which is important in connection with the plans for the electrification of the railways in Baden.

FRANCE.—*Electric 'Buses.*—At a recent meeting of the French Union de Voies Ferrées et des Transports Automobiles in Lyons, M. Chalumeau, chief engineer of that city, gave some particulars of the electric 'bus service run by the municipal authorities. Sixteen single-deck vehicles are in use, the chassis being of the De Dion type, the electrical equipment, comprising two 12-15-h.p. series-excited motors for each 'bus, having been supplied by the Tognini-Balbo Co., of Milan, Italy. The battery of Tudor-Hensemberger accumulators weighs from 2.3 to 2.5 tons, and the 'buses in running order (that is, with battery) weigh from 7.15 to 7.35 tons. The motors are directly connected with the rear wheels, the speed of the vehicles being entirely electrically controlled by means of a controller which gives five forward and two reverse speeds. Each 'bus covers a daily distance of about 56 miles, M. Chalumeau pointing out that this does not represent the full capacity of a single charge of the battery, but is a convenient running distance from the drivers' point of view. He added that trials are about to be made with the introduction of reduction gear between the motors and the road wheels; while this will probably slightly reduce the mechanical efficiency, it is expected to be more than counterbalanced by the gain in electrical efficiency.

Halifax.—NEW TRAMWAY CENTRE.—The sanction of the Ministry of Transport has been received to the scheme for the construction of a tramway centre at Bull Green, and the Tramways Committee has decided to proceed with the work.

Japan.—NEW ELECTRIC RAILWAYS.—The Tokyo Gryen Totsudo Koyo K.K. has recently applied for a charter to the Government. It is intended to construct a main electric railway line from Haneda, Tokyo-fu to Setagaya, through Omori and Magome and several branch lines on the outskirts of Tokyo. It is understood that an application for a charter has been made recently to the Railway Minister by the promoters of the Sanshin Railway. The proposed railway will be constructed in the Nagano Prefecture, and have a total length of 44 miles.

London.—"UNDERGROUND" IMPROVEMENTS.—The scheme of duplicating the tracks of the District Railway between Hammersmith and Acton Town, and the running over them of the trains of the Piccadilly Tube, as outlined by Lord Ashfield at the recent general meeting of the Underground companies, presages an important addition to the programme of Underground improvements. In addition to the extension of the Piccadilly Tube trains to Ealing and Hounslow, a general speeding-up of the western services of the District Railway will be afforded, and the additional tracks will enable a large number of Ealing and Hounslow trains to be worked on the non-stop principle between Acton and Hammersmith. The extension of the Piccadilly Tube services will provide Turnham Green, Chiswick, Acton, Ealing, and the Hounslow line stations with direct communication with Knightsbridge, Piccadilly Circus, Holborn, King's Cross, and other important centres. Between Ravenscourt Park and Turnham Green the District trains run over the lines of the Southern Railway, which here comprises four tracks, two of which—over which the old South-Western service to Waterloo, *via* Addison Road, was operated—have been virtually out of use since the war. The work entailed on this section consists in the electrification of the latter tracks and a rearrangement of the four tracks generally. It is expected that the new works will occupy about two years to complete throughout.

METROPOLITAN RAILWAY COMPANY'S BILL.—*The Times* states that the Select Committee of the House of Commons, presided over by Mr. Hopkins, heard further evidence on March 24th in support of the Bill promoted by the Metropolitan Railway Company for two short relief and facilitating railways, approximately between Edgware Road and Kilburn Priory. The estimated cost was stated to be £2,048,255.

Manchester.—PROPOSED UNDERGROUND RAILWAY.—In connection with the proposed tube for the city, the *Manchester Guardian* reports that at a meeting of the Underground Railway Committee, Mr. H. Mattinson, the tramway general manager, proposed that, instead of the scheme embracing the whole of the suburbs of Manchester, underground electric railways should be constructed between the various railway stations in the city. This would mean seven miles of underground railways, and the cost of excavation, &c., on the basis of the figures submitted for the original scheme, would be about £2,250,000. The Committee did not come to any decision, and will meet again to discuss the proposal. It was suggested that the scheme should only be taken up when the railways were electrified. Another suggestion was that there should be "through" services of electric trains between station and station, so that it might be possible to maintain services at the various stations to proceed directly underground. It was also proposed that the Corporation should construct underground railways, and that they should be leased to the railway companies.

Middlesbrough.—TRANSPORT SYSTEM REPORT.—The Corporation has adopted a recommendation, submitted by the tramway manager, Mr. H. G. Jeken, that the present tramway system in the borough be retained. In a report to the Committee, the manager stated that 20 railless cars would be required for the Linthorpe section of the tramway system to replace the present service, and the cost would be £31,000. The cost of alterations to the overhead line would amount to £4,000, and in addition there would be the cost of removing the present rails.

Middlesex.—TRAMWAY LEASE.—According to the *Tramway and Railway World*, the Middlesex County Council at a recent meeting passed a resolution requesting the Highways Committee to explore the possible alternatives to granting a new lease to the Metropolitan Electric Tramways, Ltd.

OMNIBUS COMPETITION.—The London United Tramways has informed the Twickenham Urban District Council that unless something definite is done by the Ministry of Transport to relieve the company of competition on certain routes which are flooded with omnibuses, it will be quite impossible for it to give any definite undertaking in connection with the reconstruction of the tramway in London Road, Twickenham.

Telegraph and Telephone Notes.

Czecho-Slovakia.—AUTOMATIC TELEPHONY.—A new automatic telephone system was put into operation in Prague in December, 1925. As it was impossible to complete connections for the whole city at once, the business sections were the first to be supplied, says *Commerce Reports*. Each of these sections has 4,000 connections and one central office. The remaining 8,000 connections are to be automatised during 1926.

Hungary.—INTERNATIONAL TELEPHONY.—With the view of linking Hungary with the international telephonic system, the Hungarian Post Office has concluded negotiations with the Austrian postal authorities. It has been decided to lay a new cable between Budapest and Vienna, which will be completed towards the middle of 1927. At the same time, cables between Vienna and Passau and Passau and Nuremberg are to be laid, so that the laying of the Budapest-Vienna cable means connection with the French, Belgian, Dutch, and Scandinavian systems. Among other neighbouring States with which negotiations are in progress is Czecho-Slovakia, and negotiations will shortly be initiated with Jugo-Slavia.—*Reuter's Trade Service* (Budapest).

India.—TELEPHONE DEVELOPMENT.—The Calcutta correspondent of the *Daily Telegraph* reports that remarkable strides in long-distance telephony have been accomplished in India during the past year, and the line between Delhi and Calcutta will be opened on April 1st. With the completion of the connection between Calcutta and the new capital the Posts and Telegraphs Department will have carried out practically the entire project which was taken in hand three years ago. There only remains the 1,250-mile line between Calcutta and Bombay, on which work is proceeding. The cost has been enormous, and even optimistic experts now doubt the financial results. The scale of charges has not yet been decided,

but the rate between Calcutta and Delhi is likely to be five rupees (6s. 8d.) for three minutes,, and between Calcutta and Bombay probably fifteen rupees (£1).

Jugo-Slavia. — Telephone Development. — The Jugo-Slav Postal and Telegraph Ministry is considering the carrying out of a plan for laying telephone cables to bring Jugo-Slavia into direct communication with foreign parts. According to the plan, two cables are to be laid from Avala, one to Hungary, *via* Novi Sad Subotica, and the other to Austria and Italy, *via* Zagreb and Laibach.—*Reuter's Trade Service* (Belgrade).

The Telephone Service.—The first automatic telephone apparatus in Preston was inaugurated on March 15th.

The Ipswich automatic telephone exchange was formally inaugurated by Sir John Ganzoni, M.P., on March 20th.

The Times reports that the Postmaster-General, Sir William Mitchell-Thomson, speaking at Redcar on March 23rd, said there were now 114,000 more telephone subscribers than in 1924, representing an advance of 9¼ per cent. The increase was as great in the rural as in the urban areas, 214 new rural telephone exchanges having been opened during the past 12 months. The calls registered exceeded 995,000,000.

Radio Notes.

Czecho-Slovakia.—Progress.—In spite of the rather slow beginning of broadcasting in Czecho-Slovakia, that country's electro-technical industry is very favourably situated, and so offers a solid basis for progress in wireless. At present the the industry is employed especially in the manufacture of spare parts, with which it supplies a very large number of customers. Nevertheless, several works have also begun to manufacture good receiving sets, which they are producing at advantageous prices. A system of relays has yet to be organised between Prague, Brno, and Bratislava, so that each of the three towns may broadcast the theatrical performances and concerts given by the other two.—*Reuter's Trade Service* (Prague).

Ecuador.—New Broadcasting Stations.—The Government of Ecuador has granted the request of a firm in Guayaquil to act for five years as exclusive importers of radio-telephone apparatus. The concessionaires undertake to erect two broadcasting stations, one at Guayaquil and the other at Quito, and to divide equally all profits accruing from the radio business between the Government and itself.—*Reuter's Trade Service* (Quito).

Iraq.—Import of Radio Apparatus.—The ban on the importation of radio equipment into Iraq has been lifted. Purchasers of radio sets must register with the Director of Posts and Telegraphs, however, and obtain a permit before a set may be used. Iraq has no broadcasting station, and reception is very unsatisfactory during eight or nine months of the year, says *Commerce Reports*, which indicates that it is not likely that a profitable market will develop in the near future.

New Radio Circuit.—The daily Press reports that Sir Oliver Lodge has designed a new circuit which will ensure perfect reception without aerial tuning, and will thus avoid the use of reaction. Sir Oliver, in a statement to the Press, said that the reports were entirely premature, but that he expected to be in a position to make an announcement on the subject in about a month's time.

Radio Exhibition at Birmingham.—A Birmingham and Midland Wireless Exhibition is to be held in Bingley Hall, Birmingham, from May 19th to 29th. It is being promoted jointly by the Birmingham Chamber of Commerce and the British Industries Fair (Birmingham Committee). Members of the National Association of Radio Manufacturers and Traders are to participate, and so, it is hoped, will members of other trade organisations.

Russia.—Moscow Station.—The name Popoff has been given to the new broadcasting station at Sokolonika, Moscow, in memory of the deceased Russian scientist, Prof. Popoff.

Wave-length Adjustment. — Geneva Conference. — The International Council of Wireless Experts commenced another conference at Geneva on March 22nd, at which 20 countries were represented. According to *The Times*, it has approved the fundamental principles of a new plan for the allotment of wavelengths in Europe. The detailed plan will be further examined in each country and then submitted to the approval of the Governments. The plan divides wireless stations into two classes, those having a right to exclusive wavelengths and those having a low power which are employing a common wavelength. The waves will have to be measured according to a wave-metre common to all countries and each station will be requested to keep strictly to the wavelength it has been awarded. The plan does not deal with wave-lengths under 200 metres. Three technical committees have been appointed to examine means of clearing up the interests of European wireless organisations in international problems concerning wireless matters.

Contracts Open and Closed.

(The date given in parentheses at the end of the paragraph indicates the issue of the "Electrical Review" in which the "Official Notice" appeared in our advertisement pages.)

Open.

Argentina.—Buenos Aires.—Department of Sanitary Works. May 26th. Two 1,000-kW Diesel-engine generating sets.*

May 27th. Electrically-driven centrifugal sewage pumps.*

Australia.—Brisbane.—August 27th. City Electric Light Co., Ltd. One 12,500-kW turbo-alternator and two water-tube boilers, with economisers, draught plant, &c. Specifications (£5 5s.) from the offices of the company, Boundary Street, Brisbane.

Melbourne.—May 11th. P.M.G.'s Department. Telephone jacks.*

June 16th. City Council. Turbo-alternator, exciter, and condensing plant.*

Barking.—April 20th. County of London Electric Supply Co., Ltd. Circulating-water pumps and pump-house equipment, circulating-water screening plant, and boiler-house and coal-handling plant. (March 19th.)

May 11th. Switchgear and accessories, transformers and piping equipment. March 26th.)

Barnes.—Electricity Department. E.h.p. and l.p. cables. (March 19th.)

Basingstoke.—April 6th. Electricity Department. One 600-b.h.p. heavy-oil engine and direct-coupled dynamo. (March 19th.)

Belfast.—April 17th. Electricity Department. Automatic rotary converters with transformers, h.p. and l.p. switchgear and automatic control gear. (March 26th.)

Bolton-upon-Dearne.—April 22nd. Dearne District Electricity Board. Electric cables and accessories. (See this issue.)

Chesterfield. — April 10th. Electricity Department. 9,000 tons steam slack and 7,000 tons good, clean coke breeze required during 12 months ending May 31st, 1927. Form of tender, &c., from Mr. D. H. Davies, borough electrical engineer, Electricity Works.

Chile.—Santiago.—August 20th. Chilean State Railways. Signals, telegraphs and telephones, electrical material for sub-stations, aerial lines, and lighting.*

Colwyn Bay and Colwyn.—April 8th. Electricity Department. Stores for 12 months, including cables, joint boxes, cut-outs, house-service meters, &c. (March 19th.)

Dover.—April 14th. Electricity Department. 6,250 yd. e.h.p. cable. (March 26th.)

Dundee.—April 20th. Education Authority. Electric lighting at new central Advanced School at Blackness Road. Schedules from Messrs. Maclaren, Soutar & Salmond, architects, 16, South Tay Street, Dundee.

Edinburgh.—April 12th. Electricity Department. Four water-tube boilers, economisers, and mechanical stokers or alternatively, boilers, economisers, air heaters, and mechanical stokers, or boilers, economisers, and powdered fuel plant. (March 12th.)

Egypt.—Cairo.—April 27th. Egyptian Government. 1,100 desk telephones. Chief Inspecting Engineer, Queen Anne's Chambers, Broadway, Westminster, S.W.1.

Ferry Fryston (Yorks.).—April 20th. West Riding County Council. Electric lighting installation at Ferry Fryston, Airedale, new school. Specifications from Education Department, County Hall, Wakefield.

Hazel Grove, near Stockport.—April 13th. Hazel Grove and Bramhall U.D.C. 2,300 yd. armoured cable. (March 19th.)

Halifax.—April 12th. Town Council. Wiring for electric lighting of 80 houses, Booth Lane and Nursery Lane. Particulars from Mr. P. Saunders, town clerk, Town Hall.

Hull.—Telephones Committee. Supply and installation of automatic telephone exchanges. (See this issue.)

India.—April 19th. India Store Department. Goods lift for the Imperial Record Offices at Raisina, Delhi. (A.X. 2,904.)*

April 23rd. Electrical equipment for 15 motor coaches and 42 trailer coaches. (March 5th.)

April 30th. 22,000-V cables. (See this issue.)

May 7th. 15 motor-coach underframes and bodies, 30 motor bogie trucks. (March 12th.)

May 14th. Three 5-kW oil engine-driven generator sets, one switchboard, and two pumping sets.*

Irvine (Ayrshire).—April 12th. Town Council. Electric lighting installation at 25 blocks, consisting of 100 houses. Plans from Mr. Robert Frew, architect, 3, High Street, Irvine.

Leyton.—April 9th. Education Committee. Installation of electric lighting and central heating at the Sybourn Street new school. (March 12th.)

London.—Hammersmith.—April 14th. Electricity Department. H.p. insulated cables, air-cooled and oil-cooled transformers, and h.p. sub-station switchgear. (See this issue.)

Manchester. — April 6th. Electricity Department. 3-phase, 6,600-V sub-station switchgear. (March 12th.)
3-phase, 33,000-V switchgear, 3-phase, 6,600-V switchgear, neutral earthing resistances, and trip circuit batteries. (March 26th.)
April 13th. Tramways Committee. Copper, silicum, and cadmium bronze trolley wire. Forms of tender from Mr. H. Mattinson, general manager, 55, Piccadilly.

Middlesbrough.—April 16th. Electricity Department. Six or 12 months' supply of cables and 12 months' supply of meters. (March 26th.)

New Zealand.—June 21st. Auckland Electric Power Board. L.p. insulators, &c.*
WELLINGTON.—May 12th. Post and Telegraph Department. 18 switchboards.*

Perth.—April 12th. Electricity Department. One water-tube boiler, capacity 27,000 lb. per hour. (See this issue.)

Rawtenstall.—April 7th. Haslingden Board of Guardians. Wiring for electric lighting of new nurses' home, Rawtenstall. Form of tender, &c., from Mr. A. N. Rothwell, clerk to Guardians, Union Offices, Rawtenstall.

Salford.—Education Committee. Electric lighting installation at extensions of the Broughton High School for Girls. Specifications from Mr. R. S. Martin, Secretary of Education, Education Offices, Chapel Street.

South Africa.—JOHANNESBURG.—May 6th. S.A. Railways and Harbours. Two electric goods lifts.*

Southend-on-Sea.—April 19th. Electricity Department. 1,450 current limiters. (See this issue.)

Stoke-on-Trent.—April 13th. Electricity Department. 12 months' supply of mains and cables, a.c. and d.c. meters, sub-station switchgear, and static transformers. (March 26th.)
April 12th. Gas Committee. Electrical and other machinery, gas engine and dynamo. Contract No. 35. Particulars (20s.) from the Chief Gas Engineer, Gas Works, Etruria, Stoke-on-Trent.

Walthamstow.—April 13th. Electricity Department. Steel overhead bunkers and boiler-house buildings; and coal- and ash-conveying plant. (March 12th.)

West Ham.—April 8th. Board of Guardians. Two 100-V d.c. motors, with slide rails, two starting panels, &c. (March 26th.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Closed.

Australia. — COMMONWEALTH POSTMASTER-GENERAL. — Accepted :—
Counter e.m.f. cell batteries (£811), Automatic Telephones, Ltd.; accumulator and counter e.m.f. batteries (£1,813), Tudor Accumulator Co., Ltd. *Tenders.*

Barking Town.—Electricity Committee. Accepted:—
Switchgear.—New Switchgear Construction Co., Ltd. (£386); Edison Swan Electric Co., Ltd. (£321).

Brighton.—Lighting Committee.
Supply of a storage battery for Southwick power station :—

Tudor Accumulator Co., Ltd. (Accepted.)	**£6,959**
Alternative	7,016
D.P. Battery Co., Ltd.	6,893
Chloride Electrical Storage Co., Ltd.	6,960
Pritchett & Gold & E.P.S. Co., Ltd.	7,041

Standard testing set (£523).—Ferranti, Ltd. (Accepted.)
Motor-alternator set (£385).—J. H. Holmes & Co. (Accepted.)

Tramways Committee. Accepted :—
Points and crossings (£831).—Hadfields, Ltd.
Trolley wire (£80).—F. Smith & Co., Ltd.
Brake blocks (£108).—Hamworthy Engineering Co.

Cardiff.—The *South Wales Daily News* reports that the Electricity Committee last week reconsidered the recommendation which had been referred back relating to the supply of electrical cables for which a Belgian tender at £8,818 was recommended for acceptance, as compared with £10,869, the lowest British quotation. During the discussion it was stated that the lowest British tender had now been reduced by 6 per cent. (£673) so as to keep the contract in this country. Upon the question being put to the vote the Committee reversed its previous decision and accepted the tender of Pirelli-General Cable Works, Ltd., at £10,196.

Coventry.—The City Council has accepted the lowest British tender for cable in connection with its big electricity scheme, rejecting German offers which were 12½ per cent. lower in price.

Dundee.—The Corporation Electricity Committee has recommended acceptance of a German tender for cables. It was stated that on a total of £1,052, the German offer was £206, or 20 per cent., less than the British offers.

Hornsey.—Electricity Committee. Recommended:—
Troughs, covers and bridges for 12 months.—Doulton & Co., Ltd.
Lead service shells and house fuse boxes for 12 months.—Henry Hughes and Sons, Ltd.
H.p. switchgear for 3,000-kW set (£600).—A. Reyrolle & Co., Ltd.

Hull.—According to the *Yorkshire Post*, the Corporation Telephones Committee considered a large number of tenders for cable at its meeting last week, the members being equally divided as to whether the lowest British or the lowest German tender should be accepted. For leading-in wire the German price (Dennis & Co.) was £62, against the British price (W. T. Glover & Co., Ltd.) of £91. For inside wire the Magna Wire Cable Co. (German) quoted £151, and W. T. Glover & Co., Ltd., £187. For lead-covered cable the Power and Lighting Cable Co. (German) quoted £207, and the Union Cable Co. (British) £315. German insulators were quoted at £105, and British at £161. As the voting was equal in all cases, the City Council will have to decide which offers shall be accepted.

Electricity Committee.
Air preheater (£2,500).—Howdens, Ltd. (Recommended.)

Motor connectors.—	A	B
British Thomson-Houston Co., Ltd.	£2,671	£4,668
Bruce Peebles & Co., Ltd. (Accepted.) ...	**2,533**	**4,278**
Brush Electrical Engineering Co., Ltd.	1,685	3,150
English Electric Co., Ltd.	2,589	3,840
General Electric Co., Ltd.	2,589	4,490
Metropolitan-Vickers Electrical Co., Ltd. ...	2,590	3,841

Ilford.—The Electricity Committee has reconsidered its recommendation that the tender of the Ateliers de Constructions Electriques de Charleroi at £3,000 for a 1,000-kW La Cour converter, with necessary switchgear, be accepted, and in resubmitting the report, points out that the proposed new converter is a replica of the existing one in the Uphall Road sub-station, and that the provision of the additional machine was contemplated when the original 1,000-kW La Cour motor converter was purchased by the Council.

Electricity Committee.
Feed-water heater (£110).—Worthington-Simpson, Ltd. (Recommended.)
Switchgear (£266).—General Electric Co., Ltd. (Recommended.)
440 yd. .06 sq. in. cable (£173).—Macintosh Cable Co., Ltd. (Accepted.)
440 yd. 0.1 sq. in. cable (£244).—W. T. Henley's Telegraph Works Co., Ltd. (Accepted.)

Tramways Committee. Accepted :—
1 mile of trolley wire (9½d. per lb.).—Frederick Smith & Co., Ltd.

Lamp Contracts.—The Metropolitan Water Board has placed contracts for 12 months' supply of electric lamps with the General Electric Co., Ltd., and Siemens and English Electric Lamp Co., Ltd.

Leeds.—Electricity Committee. Accepted :—
Cable.—£1,841, Enfield Cable Works, Ltd.; £4,719, Hackbridge Cable Co., Ltd.; and £2,056, Macintosh Cable Co., Ltd.
Cable troughing and covers (£2,905).—Middleton Estate & Colliery Co., Ltd.

Leicester.—Electricity Committee. Erection of two concrete water-cooling towers at power station :—

Mitchell Conveyor & Transporter Co. (Recommended.) ...	**£22,200**
Premier Cooler & Engineering Co., Ltd.	28,500

Switchgear in connection with electrification of sewage pumping plant (£570).—New Switchgear Construction Co., Ltd. ((Accepted.)

London.—LONDON COUNTY COUNCIL.—Highways Committee.
H.p. switchgear for Lewisham sub-station :—

General Electric Co., Ltd. (Accepted.)	**£1,585**
A. Reyrolle & Co., Ltd.	2,138
Bertram Thomas	2,138
British Thomson-Houston Co., Ltd.	2,448
Ferguson, Pailin, Ltd.	2,608
Switchgear & Cowans, Ltd.	2,668
Johnson & Phillips, Ltd.	2,689
Metropolitan-Vickers Electrical Co., Ltd.	2,702
New Switchgear Construction Co., Ltd.	2,766
Whipp & Bourne, Ltd.	2,811
Park Royal Engineering Co., Ltd.	2,820

Education Committee. Recommended :—
Electric service lift at Wandsworth Technical Institute :—

Medway's Safety Lift Co., Ltd.	£238
Holt & Willetts. (Recommended.)	**255**
The Hoisting Appliance Co.	297
Waygood-Otis, Ltd.	378
A. Morgan	425

HACKNEY.—Electricity Committee. Recommended :—
Switchgear for the Millfields Road power house (£12,595).—A. Reyrolle and Co., Ltd.

AIR MINISTRY.—Accepted :—
Inert cells.—Edison Swan Electric Co., Ltd.

Northampton.—Board of Guardians. Accepted:—
Installing electric light at the Institution (£449).—E. Goldston, Ltd.

Retford.—Town Council. Accepted:—
Underground mains (£9,275).—Pirelli-General Cable Works, Ltd.
Transformers and control gear (£2,516).—Foster Engineering Co., Ltd.
Consumers' meters.—Measurement, Ltd.

Stirling.—Town Council. Accepted:—
Electrical work at the new tuberculosis dispensary.—Robert Blyth & Co.

Forthcoming Events.

Edinburgh Electrical Society.—Wednesday, April 7th. At the Royal Scottish Society of Arts, 117, George Street. At 8 p.m. Paper on "The Electrical Equipment of a Battleship," by Mr. G. Peers.

National Association of Supervising Electricians.—Thursday, April 8th. At the Junior Institution of Engineers, 39, Victoria Street, S.W. At 7.15 p.m. Paper on "Electrical Heating and Hot-Water Supply for Buildings," by Mr. W. W. Nobbs.

Institution of Electrical Engineers.—Thursday, April 8th. At the Institution, Victoria Embankment, W.C. At 6 p.m. Papers on "The Application of Machinery at the Coal Face," by Mr. S. Mavor; on "The Design of Storage-Battery Locomotives for Use in Mines," by Mr. L. Miller; and on "Electricity in Mines: A Short Survey," by Mr. R. Nelson.
(North-Western Students' Section).—Tuesday, April 6th. At Milton Hall, Deansgate, Manchester. At 7.30 p.m. Annual general meeting.

Diesel Engine Users' Association.—Friday, April 9th. At Caxton Hall, Westminster, S.W. Paper on "Industrial Tests on Internal-Combustion Engines," by Mr. W. A. Tookey.

Electrical Power Engineers' Association (Southern Division).—Friday, April 9th. At the Institution of Electrical Engineers, Victoria Embankment, W.C. At 7 p.m. Lecture on "Boiler Power Plant Developments in Association with Powdered Fuel," by Mr. F. H. Rosencrantz.

Notes.

Civil Service Commission.—Forthcoming examinations for male assistant superintendent of traffic (Class II) in the London Telephone Service and male assistant traffic superintendent in the provinces (18-23); the latest date for the receipt of application forms is June 2nd. Regulations, particulars, &c., can be obtained from the Secretary, Civil Service Commission, Burlington Gardens, W.1. (See our advertisement pages to-day.)

The St. Helens Inauguration.—At the opening ceremony of the extensions to the St. Helens generating station, described elsewhere in this issue, on March 23rd, the Mayor of St. Helens, Alderman T. Hamblett, briefly traced the history and development of the undertaking since its establishment 30 years ago. To-day the plant capacity of the station was 11,800 kW. At a subsequent luncheon at the Town Hall, Councillor F. Wilson, chairman of the Liverpool Electricity Committee, spoke of the enormous electrical progress made during the last few years in South West Lancashire. For years there had been cries of "reduce manufacturing costs," and there was no doubt that to a considerable extent that would be achieved by the generous use of electrical energy.

Alderman Foster referred to the low production costs of the St. Helens undertaking, which few authorities could equal.

Alderman Sir Peter Peacock, chairman of the Warrington Electricity Committee, congratulated the St. Helens Corporation on the progress of its undertaking. Warrington envied St. Helens as being the place that had the lowest production cost of any town in the country.

Mr. F. N. Rendell Baker, Borough Electrical Engineer, replying to complimentary speeches, said that the St. Helens scheme could be greatly developed as and when required. It was regrettable that St. Helens did not possess an electricity showroom, and at an early meeting of the committee he proposed making a recommendation that a first-class showroom should be provided. He hoped that the municipalities in South-West Lancashire would be brought together, so that co-ordination could be considered for a widespread development of the demand.

Mr. W. Johnstone, of the Brush Electrical Engineering Co., Ltd., responded to the toast "The Contractors," and his remarks were supplemented by Mr. W. Bayliss, of Messrs. Babcock & Wilcox, Ltd., who presented Councillor Hewitt, as chairman of the Electricity Committee, with a silver salver on behalf of the contractors.

Local Society.—The Edinburgh Electrical Society on March 20th, paid a visit to Port Edgar, and inspected various works, the Instruction Theatre, the torpedo works, and one of the light cruisers. Following on this visit a lecture will be given on April 7th, on the "Electrical Equipment of a Battleship," by Mr. G. Peers.

Late Legal.—EDISON SWAN ELECTRIC CO. (BRANCHES), LTD.—Mr. Justice Russell, in the Chancery Division on March 30th, granted the petition of the Edison Swan Electric Co. (Branches), Ltd., for power to extend the objects of the company as allowed by its memorandum of association, and to enable it to carry on its business not only in India, but in any part of the world. Counsel, in support of the petition, said the object of it was to enable the company to carry on an extensive agency business all over the world.

Appointment Vacant.—Junior electrician (£150), for the Cardiff City Mental Hospital. (See this issue.)

National Association of Supervising Electricians.—On Saturday last this Association held its annual dinner and musical evening at the Holborn Restaurant, London; the president, Mr. A. M. Sillar, M.Inst.C.E., occupied the chair, and there was a large attendance of members and guests. After the toast of "The King" had been duly honoured, Mr. A. H. Dykes, M.Inst.C.E., past-president, proposed "The Visitors," remarking on the acuteness of the organising committee in inviting prominent engineers to become acquainted with the Association.

Mr. W. Reavell, president I.Mech.E., responded, recommending electrical engineers to give attention to the mechanical design of their apparatus, as, in his experience, it was generally the mechanical parts that gave trouble. The supervising technician, he said, was the backbone of the electrical industry. Every man engaged in industry should be concerned primarily with service to his fellow men, and secondarily with his own interests; no permanent structure could be raised on a foundation of selfishness. Sir William Noble, M.I.E.E., also responded, recalling the days when he himself belonged to a similar but secret association of supervisers in the Post Office, which at that time was a somewhat risky matter. It was now recognised to be in the interests of both workers and employers that such associations should be formed.

Mr. R. A. Chattock, president I.E.E., proposed "The Association," remarking that many years ago he was instrumental in forming an association of power engineers working on similar lines; the educational activities of such societies were admirable, but still more valuable was the idea of helping one another in time of need. The Association was growing stronger every year, and he wished it every success. The electrical industry was largely dependent on men such as their members, who were doing splendid work. The Government Bill was put forward to stimulate the use of electricity and cheapen it, but the details of the Bill were not satisfactory; it would establish a bureaucracy, which might be amenable to political influence, and the cost of standardising frequency needed thorough investigation before any drastic step was taken. The necessity of standard frequency might disappear, in which case millions of pounds would have been wasted. It seemed likely that even without the Bill, in eight or ten years they would reach the consumption aimed at by the Government.

Mr. A. M. Sillar responded, expressing pleasure at the presence of the presidents of two of the leading engineering Institutions, and recalling the time when he was supervising electrician installing electric light in the Covent Garden Theatre in the 'eighties.

Mr. R. W. Whitley proposed "The Electrical Press" in complimentary terms, and Mr. A. H. Allen, M.I.E.E., responded, remarking that the Press had never had anything but praise to say of the Association. Mr. Lathom proposed the health of the Dinner Committee, and Mr. A. Brammer, general secretary, in reply, said that the maintenance of a high standard of qualifications for membership had paid the Association well; last year the membership increased by 22 per cent. and the funds by 45 per cent.

An excellent musical programme enhanced the enjoyment of the function.

Fatality.—At Dumbarton last week an inquiry was held into a recent accident at the Old Kilpatrick sub-station of the Clyde Valley Electric Power Co., whereby a man lost his life by coming in contact with a live wire. Evidence was given that the deceased and another man were in the building on the day of the accident for the purpose of cleaning 11,000-V cubicles. The man in charge of the sub-station said that although the switch and one set of links were opened, that did not completely shut off the power. The remaining set of links should have been drawn. When the accident happened he heard a report and saw a flame inside the cubicle. In a second the whole place was on fire. At first he did not realise anyone had been injured, and he went outside, but hearing a noise he returned and saw deceased hanging on the cubicle door. His foot had come into contact with a live wire. Replying to the Inspector of Factories, witness explained that when he returned to the chamber after the explosion and helped to free deceased the conductors were still alive in the cubicle. An engineer of the company, referring to the possibility of insulating the wire with which deceased came in contact, said it was not practicable because insulation put on a conductor in that particular position would become highly charged. The jury returned a formal verdict.

London Traffic Inquiry.—The inquiry into the travelling facilities of East London was concluded on March 29th by a sub-committee of the London and Home Counties Traffic Advisory Committee at the Middlesex Guildhall. Further proposals put forward for relieving traffic congestion were a circular tramway route turning down Mansfield Street, on the left of Whitechapel High Street and continuing through the Minories back into Aldgate High Street, and so completing the circular route, and that the sewer known as the Northern Outfall running from Bow Road to Barking should be used as a tramway track, by raising the waste land on each side of the sewer and using it for the tramway only.

New Branch of the E.A.W.—There was a large and representative attendance at the inaugural meeting of the Manchester District Branch of the Electrical Association for Women held on March 25th at the Town Hall, Manchester. Alderman Dagnall, the chairman of the Electricity Committee, presided and noted that one of the objects of the Association was to advance the general use of electricity in the interest of housewives. He had used electricity in his own house for 14 years and at present had neither a gas nor a coal fire.

Miss Haslett, director of the Association, detailed the history of the Association from its inception eighteen months ago. The Glasgow branch now had 200 members; Birmingham had started well and the Manchester branch was their third venture. The Association had sought to put forward the point of view of the woman, who asked for a greater expansion in hire-purchase systems. It should be easier for working women to have electricity installed. Far more education work should be done in the schools in spreading simple electrical knowledge and that matter was having attention in the proper quarters.

Mr. S. J. Watson, electrical engineer, Salford, welcomed the formation of the new branch. Its main objects, he said, were to lighten labour in the home by means of improved apparatus. The need was great in that district on account of the tremendous amount of small property occupied by the working classes. Systems of easy payment were desirable.

Mr. Ellis, chairman of the North-Western Centre of the Institution of Electrical Engineers, encouraged the new branch. He hoped the Association would enter the wider field of considering the women engaged in electrical work. The application of electricity in the home was essentially a woman's business; and they should have women as electrical contractors.

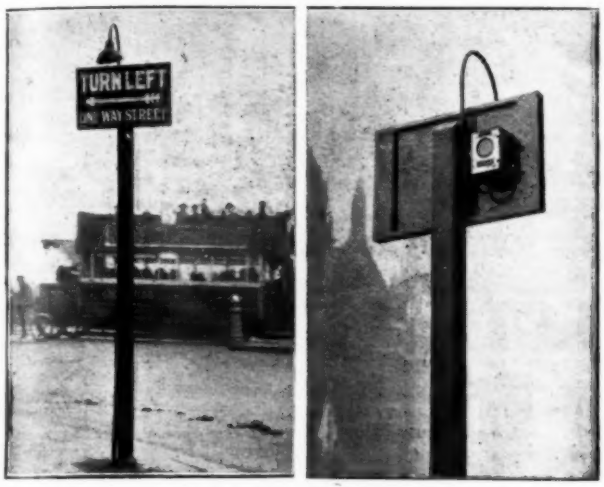
Miss G. L. Entwistle, who had convened the meeting, thanked those who had helped to secure such a representative gathering, and indicated the future programme of the Branch.

Mr. H. C. Lamb, city electrical engineer, Manchester, agreed with the previous speakers as to the new venture. The designs of electrical apparatus for the home would be improved if users could be got to say what they thought about them.

Miss Baines moved the resolution to form the Manchester District Branch, which was seconded by Mrs. Robertson and carried unanimously. The first Council was formed, and Miss G. L. Entwistle was appointed hon. secretary.

The Post Office Tube Railway.—The *Daily Mail* states that it is anticipated that the Post Office London Tube Railway will be available for traffic in the autumn. The total cost up to date has been £1,407,000.

Illuminated Traffic Signs.—The accompanying illustrations show the back and front views of one of the signs which have recently been placed in Parliament Square in connection with the new traffic-guidance regulations. The front of the board is illuminated at the necessary times by means of a suitable bracket lamp which is controlled by a Venner time switch, the latter being fixed on the back of the board.



Illuminated Traffic Signal Posts.

Institution Notes.

Institution of Electrical Engineers.—The arrangements for the remainder of Session 1925-26 include the following items:—

ORDINARY MEETINGS OF THE INSTITUTION.

April 8th.—Mr. S. Mavor. "The Applications of Machinery at the Coal Face."

April 8th.—Mr. L. Miller. "The Design of Storage-Battery Locomotives for use in Coal Mines."

April 8th.—Mr. R. Nelson. "Electricity in Mines: A Short Survey."

April 22nd.—Sir J. J. Thomson, O.M., M.A., F.R.S. The Seventeenth Kelvin Lecture. "The Mechanics of the Electric Field."

April 29th.—Messrs. B. S. Cohen, A. J. Aldridge, and W. West, B.A. "The Frequency Characteristics of Telephone Systems, and Audio-Frequency Apparatus and their Measurement."

May 27th.—Annual general meeting.

June 24th.—Annual conversazione.

WIRELESS SECTION MEETINGS.

April 14th.—Mr. E. H. Shaughnessy, O.B.E. "The Rugby Radio Station of the British Post Office."

May 5th.—Mr. R. L. Smith-Rose, Ph.D., M.Sc., and R. H. Barfield, M.Sc. "On the Lateral Deviation of Wireless Waves and the Development of an Accurate Direction-Finder."

May 19th.—Messrs. M. Thompson, M.A., R. H. Dudderidge, and J. G. A. Sims, M.Sc. (Communication from the staff of the Research Laboratories, General Electric Co., Ltd., Wembley.) "Life-Testing of Small Thermionic Valves."

June 2nd.—Mr. P. W. Willans. "Low-Frequency Intervalve Transformer."

INFORMAL MEETING.

April 12th.—Discussion on "The Linking together of Wireless and Wire Communication Systems." (Opened by Captain P. P. Eckersley.)

SUMMER MEETING.—The summer meeting of the Institution is to be held this year at the North-Eastern Centre (chairman: Mr. R. W. Gregory) during the week ending June 12th. Members will assemble to meet the local committee at the Central Station Hotel, Newcastle-upon-Tyne, on Monday evening, June 7th, and this year one evening during the week (Thursday, June 10th) has been left free, which will be appreciated by those who have friends in the district. The works to be visited are those of Sir W. G. Armstrong Whitworth & Co., Ltd., Messrs. J. H. Holmes & Co., Ltd., C. A. Parsons & Co., Ltd., and A. Reyrolle & Co., Ltd.; also the North Tees power station (Newcastle-upon-Tyne Electric Supply Co., Ltd.), a pit (Horden Collieries, Ltd.), a shipyard (Swan, Hunter and Wigham Richardson, Ltd.), a steel works rolling mills (Consett Iron Co., Ltd.), and the Lemington glass works (G.E.C.). There will also be an opportunity of seeing Durham Cathedral, and an excursion to Hexham and the Abbey has been arranged, together with the usual civic receptions, dances, &c. It is advisable to book hotel accommodation as early as possible, and members who have friends in the district are urged to endeavour to obtain private hospitality if possible, as the pressure on hotel accommodation in Newcastle during the summer is great.

INFORMAL MEETING.—At the informal meeting on Monday, March 22nd, Mr. A. H. Allen was in the chair, when Mr. G. Rogers opened a discussion on "The Performance of Mercury Arc Rectifiers." Mr. Rogers is an official of the Birmingham electricity works, where he has control of about 10,000 kW of gasfilled rectifiers, and he has an unrivalled experience of this method of converting. He is an enthusiastic advocate of the apparatus, and the British-made rectifier now being produced has his complete approval. His opening was not a formal treatise, but was intended as a supplement to his paper read before the Institution. He therefore dealt at length with the difficulties and objections sometimes associated with rectifiers, and invited discussion of these opinions. He expressed the belief that the life of the valve, which, with reasonable care, was now very lengthy, would be almost indefinitely prolonged by the oil-jacketing as applied to the latest types. The rise of temperature and the ventilation of the cylinder had been the chief difficulties hitherto, and it would seem that oil cooling would eliminate these troubles. An exceptionally prolonged and interesting discussion followed, in the course of which Mr. A. Honeysett said he had dispatched to a remote pumping installation some 300 kW of English rectifiers, which had made a perilous journey quite successfully and had now been in operation for a long period, giving every evidence of entire reliability.

LOCAL WIRELESS SECTIONS.—The Committee of the North-Western Centre, at the request of the Council, is considering the formation of a Local Wireless Section, and has issued a questionnaire on the subject to its members.

Incorporated Municipal Electrical Association.—ANNUAL CONVENTION.—The preliminary programme of the Convention to be held at Glasgow, from June 14th to 19th, 1926, has just been issued. On Monday, June 14th, there will be a reception by the President and Mrs. R. B. Mitchell, Councillor Dr. Dewar (convener of Electricity Committee) and Mrs. Dewar. On Tuesday the Convention will be opened in St. Andrew's Hall with a civic welcome by the Lord Provost of Glasgow, Sir Matthew W. Montgomery, followed by the presidential address of Mr. R. B. Mitchell, and a paper on "The Practical Working of the Principles of Whitleyism from a Management Point of View," by Alderman W. Walker, M.I.E.E., M.I.Mech.E. After luncheon, as guests of the Corporation of Glasgow, there will be a visit to Dalmarnock power station, and in the evening the Lord Provost and Magistrates will hold a reception, with dancing and a concert, in the City Chambers. On Wednesday a paper will be read on "Supplies to Outlying Districts," by Mr. S. E. Britton, M.I.E.E., M.I.Mech.E., and in the afternoon a visit to Messrs. Babcock & Wilcox's works (Renfrew) will take place. On Thursday papers will be read on "Operating Costs of Electric Battery Vehicles," by Mr. C. W. Marshall, and "Industrial Heating," by Mr. A. P. M. Fleming. The annual dinner will be held in the evening. On Friday, after the annual general meeting there will be a visit to the Falls of Clyde (Clyde Valley Co.'s hydro-electric scheme), or to the Trossachs. On Saturday the events are a visit to the tramway power station at Pinkston, and an inspection of the bulk supply 33,000-volt overhead line between Greenock and Paisley. An exhibition, comprising electric cooking and water-heating apparatus, together with any other apparatus or appliances of interest to electricity supply authorities, will be held in Sauchiehall Street, close to the Corporation Electricity Department's showrooms. There will be included in the exhibition a demonstration of modern lighting methods. All communications prior to June 10th should be sent to the secretary, I.M.E.A., Electric House, 38, High Street, Croydon.

Institute of Transport.—EXAMINATIONS, 1926.—As a result of the large number of applications to sit for the Graduateship and Associate Membership examinations to be held on April 15th and 16th next, the Institute Council has arranged for candidates to be examined at the following centres:—London: King's College, Strand, W.C.2. Manchester: High School of Commerce, Spring Gardens. Leeds: The University.

Our Personal Column.

(Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements).

It was reported to the Haslingden Town Council, on March 25th, that the Whitley Council recommended an increase of £50 in the salary of the tramway manager.

Mr. GEORGE P. SHALLCROSS, who has been electrical engineer to the Birkenhead Corporation since 1913, will retire in June next, having reached the age limit. He has been in the service of the Corporation for 27 years, and has carried out many extensions to the electricity supply in the borough and the adjoining districts. The Town Council, at its meeting on March 31st, will be recommended by the Electricity Committee to approve the appointment of Mr. FRANCIS EDWARD SPENCER, the assistant electrical engineer, to succeed Mr. Shallcross. Mr. Spencer, who is 44 years of age, entered the service of the Corporation as switchboard attendant in 1899. He was appointed to his present position in 1913.

Sir BENJAMIN LONGBOTTOM, of Electromotors, Ltd., was on March 26th elected president of the Manchester Association of Engineers.

Last Saturday afternoon Mr. R. B. MITCHELL inaugurated a new pavilion at the grounds laid out at Dalmarnock for recreation in connection with the Glasgow Corporation Electricity Department's welfare movement. Mr. Mitchell, who is to represent the I.M.E.A. at the conferences of the International Electrotechnical Commission in New York, was to

sail from Southampton on April 2nd. Following the ceremony on Saturday, he was presented with a fitted dressing case, a cabin trunk, and a travelling rug for his voyage.

Prof. W. Peterson, of the Technical High School, Darmstadt, has been elected a director of the Allgemeine Elektrizitats Gesellschaft, of Berlin, in succession to the late Prof. Dr. Klingenberg.

Accrington Electricity Committee recommends that the electrical engineer's bonus be increased from £165 to £214, making his total remuneration £914 per annum.

Mr. E. T. Wright, A.M.C.T., son of Mr. Arthur S. Wright, of Blackpool, has been appointed principal electrical engineer at the Manchester offices of the Traction Equipment Co. Mr. E. T. Wright was for over eight years with the Metropolitan-Vickers Co. at Trafford Park; he left that company to take up his present position. He was recently married to Miss Vera M. Brooke, daughter of Mr. W. A. Brooke, Altrincham.

Mr. A. P. M. Fleming, manager of the Research and Education Department of the Metropolitan-Vickers Electrical Company, was one of the chief visiting speakers to crowded gatherings in the course of the City of Bradford Education Week, which ended on March 27th.

Mr. J. W. Negus, foreman of the overhead equipment section of the Bradford City Tramways Department, retired at the end of March after over 40 years' service in the local tramways. He was presented with a silver rose bowl and case of pipes.

Mr. A. A. Campbell Swinton, F.R.S., has given up his offices at Victoria Street, S.W., and all communications should be sent to him at 40, Chester Square, S.W.1, which is his sole permanent address.

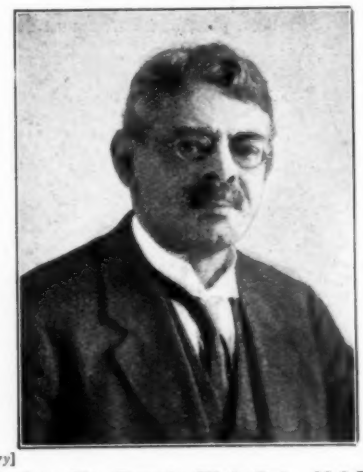
In March Mr. F. H. Livens, M.I.Mech.E., director and chief engineer of Messrs. Ruston & Hornsby, Ltd., completed 50 years' service with the company. At a board meeting on March 23rd the chairman, on behalf of the company and directors, presented him with an oil painting. The picture is by Niemann, and the subject, "Lincoln," as seen in 1858 from the Witham banks of the south-east of the city.

Ald. J. Cope has just completed 25 years as chairman of the Tramways Committee of the Walsall Corporation. On Friday last he was presented with an oak armchair (made from an old tramway sleeper), a wallet, and an illuminated address, from the staff and employés of the undertaking.

The John Fritz Medal Board of Award, representing the American Societies of Civil, Mining, Mechanical, and Electrical Engineers, announces the presentation of the John Fritz gold medal to Edward Dean Adams, "engineer, financier, scientist, whose vision, courage and industry made possible at Niagara Falls the birth of hydro-electric power."

Obituary.—Mr. Francis Hird.—We regret to record that Mr. Francis Hird, B.A.(Cantab.), managing director of Siemens Bros. & Co., Ltd., passed away on March 25th at Lanark House, Old Charlton, S.E.7, in his 59th year. Mr. Hird was also managing director of Siemens & English Electric Lamp Co., Ltd., and Caxton Electric Developments, Ltd. He was further a director of the following companies:—Siemens and General Electric Railway Signal Co., Ltd.; Elliott Bros. (London), Ltd.; the Enfield Cable Works, Ltd.; St. Helen's Cable & Rubber Co., Ltd.; and the Fixed Price Light Co., Ltd. Mr. Francis Hird was born—of British parentage—in Paris in 1868. He came to England in early childhood, and was educated at the Bradford Grammar School, from which he obtained a Natural Sciences Exhibition at Trinity College, Cambridge, and studied under Professor J. J. Thomson at the Cavendish Laboratory. He obtained a First Class in the Natural Sciences Tripos, and took his degree of B.A. in 1887 at the rather unusually early age of 19. In 1889 Mr. Hird joined the staff of Messrs. Siemens Bros. & Co., Ltd., and after a few years became chief dynamo designer to that company. In due course, after having gained some commercial experience, he became head of the company's Electric Light and Power Department. In connection with the various activities in electrical development proceeding at that time, it may be mentioned that Mr. Hird took a considerable personal share in the design and construction of the original equipment of the Waterloo and City Railway. For some time he was works manager of Siemens Bros.' Dynamo Works, Ltd., at Stafford, subsequently returning to Siemens Bros. & Co., Ltd., in order to take charge of their Apparatus Department and to develop their light-current work generally. In this connection he inaugurated their Telephone Department, and thus enabled Siemens Bros. & Co. to be among the first to introduce practical automatic telephone exchanges in this country. Mr. Hird was appointed general manager of Siemens Bros. and Co., Ltd., in 1922, and managing director in April, 1925. He leaves a widow and two daughters.

The funeral took place on Saturday last at Charlton Cemetery. A service was held at St. Paul's Church, Old Charlton, prior to the interment. It was conducted by the Rev. Derman Christopherson, M.A., and the lesson was read by Sir William Bull, M.P., a co-director of Mr. Hird's. Those present in addition to his widow, two daughters, and other relatives, included Mr. G. Mure Ritchie, chairman of Siemens Brothers & Co., Ltd.; Mr. W. O. Smith, M.I.E.E., one of the directors of the company; Dr. H. Wright, general manager of Siemens Brothers and Co., Ltd., and members of the Company's staff; representatives of Siemens & English Electric Lamp Co., Ltd., Siemens and General Electric Railway Signal Co., Ltd., and Elliott Brothers (London), Ltd.; Sir G. H. Hume, M.P., chairman of the London County Council; Mr. L. B. Atkinson (Cable-Makers' Association); Mr. M. J. Railing (General Electric Co., Ltd.); Mr. R. G. Cavell, representing Sir Alexander Roger,



Elliott & Fry] [*London.*

The late Mr. Francis Hird, B.A., M.I.E.E.

chairman of the Automatic Telephone Manufacturing Co., Ltd.; Sir Frank Dyson, Astronomer Royal; and representatives of the Siemens Foremen's Association, the Siemens Staff Club, and the Siemens Sports Club.

Prof. A. Witz.—The death recently took place in Lille, France, at the age of 77 years, of Prof. Aimé Witz. The deceased was an authority on internal combustion engines and heat utilisation, and had taken a prominent part in electrical developments in France.

Alderman Smithson.—We regret to record that Alderman R. A. Smithson, who had been a member of the Leeds City Council for 30 years and had taken a leading part in connection with the tramways, passed away last week.

Mr. G. S. Corlett.—We regret to note that Mr. George Stephen Corlett, M.I.E.E., M.I.Mining E., passed away at Wigan on Sunday last, March 28th. Mr. Corlett, who was born in the Isle of Man in 1866, was articled to Mr. Sydney F. Walker, of Cardiff, and after some years engineering experience he was from 1890-92 with Messrs. Mercier, Corlett and Co., electrical contractors at Wigan, and subsequently managing director of the Corlett Electrical Engineering Co., Ltd., from 1892-1914. In the latter year he started as a consulting engineer, and specialised in the carrying out of electrical installation work in English and Welsh Collieries. Mr. Corlett was a past-president of the Association of Mining Electrical Engineers.

Wills.—The late Mr. Arthur L. Cottam, wholesale electrical supplies factor, Bristol, left £8,591.

According to *The Times*, Mr. William Hampson, a leading member of the Council of the Röntgen Society and lately medical officer in charge of the electrical and X-ray departments of the Queen's Hospital for Children, left £5,574.

New Companies Registered.

Esono, Ltd. (212,669).—Private company. Registered March 24th. Capital, £1,500 in 1,000 ordinary shares of £1 and 10,000 deferred shares of 1s. Objects: To acquire (1) from W. Edwards the registered trade mark "Esono," (2) the tenancy of premises at 492, Prescot Road, Old Swan, Liverpool, together with the tenant's fixtures, fittings and tools therein, personal property, and assets of the proprietor of the business known as "Edwards, Son & Co.," electrical, mechanical, radio and automobile engineers, and the goodwill thereof; and (3) the tenancy of the premises and workshop at rear thereof, together with the business, assets and liabilities of William Roberts as a building contractor, and all fixtures, fittings, personal property and assets of the proprietor of that business. The permanent directors are:—Mrs. Annie P. Edwards, 1a, Childers Street, Old Swan, Liverpool; W. Edwards, 1a, Childers Street, Old Swan, Liverpool, electrical engineer (managing director); J. J. Fox, 28, Richard Kelly Drive, Walton, Liverpool, book-keeper; W. Roberts, 344, Queen's Drive, Knotty Ash, Liverpool, jobbing contractor. L. Carlen, 45, Osborne Road, Tuebrook, Liverpool, electrician. Qualification, £10. Remuneration, £150 per annum, divided between them. Solicitors: Bartlett & Son, 30, North John Street, Liverpool.

Cogent Electrical Co., Ltd. (212,526).—Private company. Registered March 19th. Capital, £500 in £1 shares. Objects: To carry on the business of electricians, electrical contractors, electrical, mechanical and general engineers, manufacturers of electric or other motors, electric or other lighting sets, toys of all kinds, and parts relating to wireless, &c. The directors are:—A. J. Singlehurst, 30, Falkner Street, Liverpool, electrical engineer; G. H. Miller, 17, Sunningdale Road, Wallasey, Cheshire, wireless operator. Qualification, £100. Solicitors: T. J. Smith & Son, 7, Harrington Street, Liverpool. Registered office: 54, Berry Street, Liverpool.

Callingham Electric Supplies Co., Ltd. (212,628).—Private company. Registered March 23rd. Capital, £100 in £1 shares. Objects: To carry on the business of electricians, electrical engineers, mechanical engineers and manufacturers, &c. The directors are:—G. Davis, 30, Penywern Road, Earl's Court, S.W.5; C. Howson, 144, Bromley Road, Beckenham, Kent. Qualification, £1. Solicitors: R. S. Jackson & Bowles, Ingram Court, 167, Fenchurch Street, E.C.3. Registered office: 121, Westbourne Grove, W.2.

F. F. Chrestian & Co., Ltd. (E.2,519).—Incorporated outside U.K. Particulars were filed on March 13th, pursuant to Section 274 of the Companies (Consolidation) Act. The company was incorporated in Calcutta on January 6th, 1912. The Indian address is Domchanch, Bihar. The British address is Finsbury Court, E.C.3, where E. Berkeley, engineer, and A. Berkeley, chartered electrical engineer, are authorised to accept service of process and notices on behalf of the company. The directors are :—Sir Henry P. W. Macnaghten and Geoffrey L. Winterbotham, both Indian agents, of 9, Wallace Street, Bombay. No memorandum and articles of association have yet been filed.

Nivalight, Ltd. (212,639).—Private company. Registered March 23rd. £1,000 in £1 shares. Objects: To carry on the business of dealers in electric lamps, &c. The first directors are :—H. Kaphan, 159, Eastern Esplanade, Southend-on-Sea, merchant; H. G. Coxon, 190, Bishopsgate, E.C.2. Qualification, 2 shares. Solicitor: P. S. Costerton, 190, Bishopsgate, E.C. Registered office: Pooles Buildings, Mount Pleasant, Clerkenwell, W.C.1.

Truro Electricity Supply Co., Ltd. (212,726).—Private company. Registered March 26th. Capital, £5,000 in £1 shares. Objects :—To carry on in Truro, Cornwall, and elsewhere the business of an electric light and power company, &c. The first directors are :—A. N. Rye, 11, Tothill Street, Westminster, S.W. (general manager, Edmundsons Electricity Corporation, Ltd.); L. A. Hards, Penlu, Tuckingmill, Camborne, Cornwall (manager, Cornwall Electric Power Co.); C. H. Jones, 67, Hayes Road, Bromley, Kent. Qualification, £50 shares. Remuneration as fixed by the company. Solicitors: Godfrey, Warr, Clarkson & Co., 85, Gracechurch Street, E.C. Registered office: Broad Sanctuary Chambers, Tothill Street, Westminster, S.W.

Southern Lighting and Ignition Co., Ltd. (212,725).—Private company. Registered March 26th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical, mechanical, motor and general engineers, manufacturers of and dealers in radiators, dynamos, magnetos, transformers, motors, and all kinds of electrical goods and plant, manufacturers of and dealers in motor cars, cycles, &c. The subscribers (each with one share) are :—W. T. Beer, 2, Westfields Road, Acton, W.3, solicitor; Ethel E. Windsor, 51, Campden Houses, Kensington, W.8, stenographer. The first directors are to be appointed by the subscribers. Solicitors: W. P. Guillet, 55, Berners Street, W.1.

London and South Wales Electrical Engineers, Ltd. (212,629).—Private company. Registered March 23rd. Capital, £5,000 in £1 shares. Objects: To carry on business as electrical engineers and contractors, general, mechanical, wireless and radio engineers, builders, contractors and dealers in metal, stone, wood, &c. The subscribers (each with one share) are :—H. B. Giles, 66, High Street, Marlow, Bucks., surveyor; H. J. Norris, 138, Ashley Down Road, Bristol, builder's general foreman. The first directors are to be appointed by the subscribers. H. B. Giles signs as manager. Qualification, 250 shares. Remuneration (except managing director or manager) as fixed by the company. Solicitors: Lewis Morgan, Browne and Haslam, 31, High Street, Cardiff. Registered office: Gordon Works, Crockherbtown Lane, Park Place, Cardiff.

Chorlton Metal Co., Ltd. (212,594).—Private company. Registered March 22nd. Capital, £1,000 in £1 shares. Objects :—To acquire the business of radio and wireless merchants, manufacturers, importers, and general dealers carried on by M. Hacker and L. M. Galansky at 60, Long Millgate, Manchester. The permanent directors are :—M. Hacker, 27, Brighton Grove, Fallowfield, Manchester, merchant; L. M. Galansky, 333, Waterloo Road, Hightown, Manchester, merchant. Qualification, £100. Remuneration as fixed by the company. Secretary and solicitor: J. Prior, 7, Brazennose Street, Manchester.

Dalry Electric Supply Co., Ltd. (14,059).—Private company. Registered in Edinburgh on March 20th. Capital, £2,000 in £1 shares. Objects: To carry on the business indicated by the title. The directors are :—Lord Sinclair, Milton Park Lodge, Dalry, Kirkcudbrightshire, 100 shares; T. Edgar, Newfield, Dalry, Kirkcudbrightshire, farmer, 200 shares; A. Young, Garrock, Dalry, Kirkcudbrightshire; W. R. Gourley, Kinbank, Dalry, Kirkcudbrightshire; Mrs. E. I. Chisholm, Lochinvar Hotel, Dalry; T. Rankin, Dalry, baker. Qualification, 25 shares. Secretary: A. Milroy.

Official Returns of Electrical Companies.

J. Springer, Ltd. (in liquidation), electrical consultants and engineers, &c.—R. H. Collett, of 84, Chancery Lane, E.C., ceased to act as receiver or manager on March 12th, 1926.

Satisfaction in full on March 12th, 1926, of debenture dated December 30th, 1922, securing £7,000.

Johnson, Savage & Co., Ltd.—A. P. Barber, of 35, Walbrook, E.C.4, was appointed receiver on March 16th, 1926, under powers contained in first debenture dated October 14th, 1924.

Neutron, Ltd.—W. S. Dawson, C.A., of 31, Great James Street, Bedford Row, W.C., was appointed receiver and manager on March 17th, 1926, under powers contained in debenture dated September 29th, 1924.

Richard Marsden & Son, Ltd.—Mortgage on 115, Church Street, Preston, with machinery, &c., dated March 12th, 1926, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

Electricity Distribution of North Wales and District, Ltd.—First mortgage debenture dated March 12th, 1926, to secure £100,000 charged on the company's undertaking and property, present and future, including uncalled capital. Holder: The Treasury Solicitor. (The company may not without the sanction of the Commissioners of H.M. Treasury and the registered holder create any mortgage or charge on any part of its property or assets ranking, *pari passu*, with or in priority to this charge.)

Normand Electrical Co., Ltd.—Particulars filed of £2,000 debentures authorised December 3rd, 1925, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £1,200.

C. J. Thursfield & Co., Ltd.—Satisfaction in full on March 16th, 1926, of debentures dated December 27th, 1922, to December 16th, 1925, securing in all £3,250.

Watford Radio Supplies, Ltd.—W. R. Faulkner, of 133, Lower Paddock Road, Oxhey, Watford, ceased to act as receiver on February 20th, 1926.

Morley Electrical Engineering Co., Ltd. (52,358).—Capital, £5,000 in £1 shares. Return dated February 22nd, 1926. All shares taken up. £3,980 paid. £1,020 considered as paid. Mortgages and charges, £3,000.

Lamp Manufacturing Co., Ltd. (76,151).—Capital, £10,000 in £1 shares. Return dated February 11th, 1926. 5,400 shares taken up. £5,400 paid. Mortgages and charges, £2,500 debentures.

British Brown, Boveri, Ltd. (89,167).—Capital, £50,000 in £5 shares. Return dated December 18th 1925. All shares taken up. £21,250 paid (being £2 10s. per share on 8,500 shares). £7,500 considered as paid (being £5 per share on 1,500 shares). Mortgages and charges, nil.

Sturge & Baker, Ltd. (181,382).—Capital, £8,000 in £1 shares (1,500 preference and 6,500 ordinary). Return dated February 9th, 1926. 1,500 preference and 5,896 ordinary shares taken up. £7,396 considered as paid. Mortgages and charges, nil.

Torpoint Electric Supply Co., Ltd.—Satisfaction in full on February 27th, 1926, of debentures dated June 11th, 1923, securing £5,500. Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated February 27th, 1926, to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd.

Bower Electric (1926), Ltd.—Particulars filed of £1,500 debentures authorised January 28th, 1926, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Energo Products, Ltd.—Debenture dated February 22nd, 1926, to secure £1,244 11s. 8d., charged on the company's undertaking and property, including uncalled capital. Holders: V. B. M. Mallentjer, 57, Scarsdales Villas, W.8; and A. L. Vandervelde, 166, Marylebone Road, W.8.

Hammersley Brothers, Ltd.—Particulars filed of £500 debentures authorised March 8th, 1926, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £300.

Atkins & Wallis, Ltd.—Particulars filed of £500 debentures authorised February 26th, 1926, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £250.

Bell Battery and Accessory Co., Ltd.—F. Wilcock, of 1, Great Winchester Street, E.C.2, ceased to act as receiver or manager on February 27th, 1926.

Siemens Brothers & Co., Ltd.—Satisfaction to the extent of £20,000 on January 1st, 1926, of debenture stock dated January 15th, 1918, securing £1,330,000.

Glantawe Electric Supply Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated February 19th, 1926, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd.

W. S. Jeal & Ebury Engineering Co., Ltd.—A. E. Tilley, of 8, Staple Inn, Holborn, W.C.1, ceased to act as receiver or manager on March 15th, 1926.

Orford Electric Light and Power Co., Ltd.—Issue on March 9th, 1926, of £300 debentures, part of a series already registered.

City Notes.

Reports and Meetings of Electrical Companies, Dividend Results, &c.

Metropolitan-Vickers Electrical Co., Ltd.

The annual meeting was held on March 23rd, Major-Gen. Sir Philip A. M. Nash, K.C.M.G., in the chair. In proposing the adoption of the report (*vide* our last issue, p. 510), the Chairman said that for some time past there had been a falling off in orders for heavy electrical plant in the home market, which position, in his opinion, had been partly created by the pending legislation in connection with the supply of electrical energy. During the last ten days or so two publications of very great importance to the electrical manufacturing industry had appeared. One was the report of Lord Weir's Committee, which not only gave an account of the progress of the supply of electrical energy up to date, but also set forth the steps necessary to bring this country up to a standard which would place it more on an equality with other big producing countries. The Committee recognised that Great Britain was favourably placed as a potential producer and distributor of cheap electrical energy, and that to remedy the backward condition in which our country to-day found itself, it was not merely a question of cheap generation of power in large power stations, but it was just as much a problem of proper transmission and distribution of energy. The report showed the great possibilities that lay before a large manufacturing concern like theirs, and he could assure them that the company possessed resources of both plant and personnel which were fully capable of taking their full share of that great electrical development. The draft Bill appeared to give effect to most of the recommendations of the Committee, particularly the setting up of a Central Electricity Board, but it appeared to him that under the terms of the Bill the Central Electricity Board was being surrounded by such restrictions as to make it doubtful whether it could function effectively and quickly. As manufacturers the company desired naturally to support legislation on broad national grounds, which would increase the use of electricity in this country, but at the same time they deprecated any steps being taken that would even temporarily restrict the progress, which large power undertakings—many of which were municipally owned—had been making during the last five years under existing conditions. The company had had its full share of business from such concerns, and he feared that progress might be arrested for the time being, and they must be prepared to see a falling off in their home sales, at any rate until the Bill had got a good long distance in its passage through Parliament. Another document which had just been published and was of very great importance to the electrical industry, was the report of the Royal Commission on the Coal Industry. That Commission had recorded its opinion that the development of electricity supply under the new proposals of the Government must be closely co-ordinated with such generation of electricity at the mines as might be undertaken by the suggested Coal Controlling Authority. There seemed to be a danger of confusion and overlapping between the work of the Electricity Board suggested in the Electricity Bill and the Fuel and Power Committee. It would appear to be necessary that in the creation of those new bodies care should be

taken that in so far as electricity was generated under the operations of the body set up under the Coal Commission's Report, that should be closely co-ordinated in some way with the work of the Electricity Commissioners and the contemplated Central Electricity Board. Reverting to the company's affairs, Sir Philip said that the export business since January 1st had been satisfactory in volume and indicated an ever increasing hold of the company on Dominion, Colonial and foreign markets. The export business obtained during 1925 constituted a tonnage record in the history of the company and there was every indication at the present time that they would be able to maintain that during the current year. There was still only the barest margin of profit in such business; competition grew, if anything, more severe, but the business was essential to the company, not only from the small profit which it contained, but more particularly from the point of view of the employment of workmen and of absorbing the heavy standing charges incidental to a highly technical business such as theirs. Export work was all-important from another point of view. Owing to the relatively backward condition of this country electrically, their largest units in practically every line of manufactures went abroad, and in addition their new technical developments, which alone could keep them in the forefront of the industry, arose almost entirely from the needs of the export market. The carrying on of this work should put them in the best possible position to tackle the large developments at home which were expected from the electricity legislation now before Parliament. Among the countries from which they had continued to obtain business were Norway, Russia, Holland, Rumania, Belgium, Spain, Persia, Burma, Palestine, China, Japan, India, Australia, New Zealand, South Africa, Brazil, Argentina, and Chile. The largest rotary converters that they had ever built went last year to New South Wales, and they were now constructing a turbo-generator unit and condensing plant for Japan larger than any that they had previously produced. The same remark applied to three water-wheel alternators now being constructed for Chile. The operation of the seventy-eight locomotives built for the South African Government had been satisfactory and they received last year a repeat order for seventeen additional locomotives. It was of interest to note that the great buk of the traction work carried out by the company and other English companies during the last three years had come from abroad, and in every instance where the electrification was in active operation, the financial results had more than justified the calculations on which it was based. Another development progressing with ever-increasing volume was that of automatic converter sub-stations with, in many cases, the addition of supervisory control; the order for sixteen rotary converters for the Bombay, Baroda and Central India Railway electrification, with its complement of transformers, switchgear, and control apparatus, was a good example of that kind of work. South Africa also provided some special features in the orders for a number of very large winders for the Rand Mines, among which was that for the City Deep Mine believed to be the largest electric winder ever ordered. Having referred with satisfaction to the progress which was being made by the separate company formed to deal with the supply side of the company's activities, and to the continued good work of the research and education departments, the Chairman concluded by stating that the relation between the management and the workers continued to be of the most satisfactory character and in that connection he mentioned that one of their machinists and the chairman of their works committee was chosen as the representative of the electrical industry in the party of workers now in the United States under the auspices of the *Daily Mail*. Mr. Alex Spencer, the vice-chairman, seconded the motion, which was carried unanimously.

British Electric Transformer Co., Ltd.

The annual meeting was held on March 25th, Mr. A. F. Berry, chairman of the company, presiding. In presenting the report and accounts, which were reviewed in our last issue (p. 511)), the chairman said that the company had started the year under review with a fair amount of work in hand, but the rate of improvement did not continue, so that the second half of the year did not yield so substantial a return as they might reasonably have expected. Immediately there were signs of upheaval in any one of our staple industries, the news was flashed round the world, and orders which would have come here were deflected to those countries from which delivery could definitely be relied upon. Unlike the electricity supply industry, manufacturers had no monopoly, but had stern competition from all sides, and to some extent their general charges must be borne by export work. He hoped that orders would not be sent abroad while manufacturers of this country had so great a need of the work. With regard to the future, the chairman said that, given a year free from interruption and work coming in as at present, they might hope to hold their own with difficulty. To secure the volume of work which they required at prices yielding even a small profit, was as hard to-day as they had ever known it. The holders of the ordinary shares had not yet any return in the way of dividend, but the preference shareholders had at least the satisfaction of seeing the substantial arrears of dividend paid off. Had it not been for those arrears of preference dividend, the ordinary shareholders might reasonably have expected some small return on their holdings. Electrical manufacturing companies, like most other engineering firms, still laboured under difficulties with regard to low wages, which were difficult to remedy. So long as men in "sheltered" occupations received wages in excess of those that could possibly be paid to their skilled men, no one in the engineering industries could feel satisfied. The elimination of that fundamental difficulty seemed but little nearer than a year ago. As a manufacturing country dependent on obtaining orders from abroad, every effort should be made to reduce risks of dislocation of industry. Foreign customers would not place their orders here unless they could feel certain that their goods would be delivered to time. The recent interest in the ordinary shares of electrical manufacturing firms seems to have been occasioned chiefly by the publicity received by the Government's Electricity Bill. While they all hoped that something useful would emerge from the proposals contained in the Bill, it was certain that the utmost goodwill and hearty co-operation of the various interests concerned would be needed if the country in general and the electrical trades in particular were to derive much benefit from the Bill. In the electrical industry the moderate success achieved so far was mainly the result of individual initiative and enterprise, and in spite of legislation, rather than because of it. Even now it was not certain whether the good to the country or to the industry resulting from the publicity that had heralded the Government's proposals, might not even set us back temporarily. Unfortunately, since the Government proposals had been brought forward, there was a feeling amongst many who ought to know better, that electricity was "*going* to be cheap," whereas in point of fact in many places it was not only cheap to-day, but ready to hand. Referring to the Company's domestic appliance business, Mr. Berry said that the development of the heating and cooking load had undoubtedly begun to stimulate the demand for electrical plant, machinery, cables, switchgear, &c. Electrical equipment firms, such as their own, would surely reap much added business from the development of that section of industry. The report and accounts were adopted.

British Insulated Cables, Ltd.

Mr. James Taylor (chairman) presided at the annual meeting on March 22nd, and in moving the adoption of the report and accounts (ELEC. REV., March 19th, p. 472), said that a great deal of the remarkable increase in the profit was attributable to increased dividends received on investments. Apart from their strictly manufacturing business, they undertook large contracts for the laying of cables, erection of power lines, and the electrification of railways, and provision was made out of profits to cover them against unforeseen contingencies. Such contracts frequently took several years to complete, and during the past year the work under some of them was finished and credit balances were left, which they had been able to take into their accounts. Of late years they had spent large sums in improving and extending their factories and they were now reaping the benefit in lower manufacturing costs. Another reason for the larger profit was the greatly increased output. None of the profit had been derived from higher prices to customers. To show that their workpeople had participated in the company's prosperity, Mr. Taylor said that in 1913 wages at the Prescot works represented 10.80 per cent. of the turnover; in 1925 the wages amounted to 18.50 per cent. On the other hand, dividends had fallen from 7.12 per cent. of the turnover in 1913 to 5.14 per cent. in 1925; thus, to maintain the dividend they had had to increase their turnover. Dealing with the activities of the company during the past year, the chairman said that they had disposed of their lamp business, which in some ways interfered with their more legitimate business. The trade of the Indian Cable Co., Ltd., was steadily growing and progressing satisfactorily. During the year about £300,000 had been spent in the extension of buildings, plant, and machinery, and they now had one of the most efficient factories in the country. Investments in other undertakings during the year had increased by about £84,000. The Midland Electric Corporation, in which they held a considerable interest, continued to do well, maintaining the dividend and bonus of 15 per cent., as well as offering a new issue of shares at a bonus price to existing shareholders. The Electric Supply Co. of Victoria had put in new plant which was working well, and had improved the company's position. The Automatic Telephone Manufacturing Co. was also progressing satisfactorily. Their bonus scheme, by which the staff received part of their payment according to output, was proving very successful. The scheme was originated when the share capital was only £500,000, the basis being that after 10 per cent. had been paid in dividends, the staff participated in the profits. Two subsequent issues of bonus shares had necessitated readjustments of the basis, but the staff had not suffered any loss and the directors believed that they were studying the best interests of the shareholders by securing that every member of the staff had a personal incentive to produce the best results. The report and accounts were adopted, and a proposal to increase the directors' remuneration was approved, subject to confirmation at a later meeting.

County of London Electric Supply Co., Ltd.

The annual meeting was held on March 23rd. Sir Harry Renwick, K.B.E., who presided, said that the report (ELEC. REV., March 19th, p. 471), was the most satisfactory one yet presented to the shareholders. The gross receipts showed an increase well over £90,000, and of this increase £70,000 arose from the increased sale of energy and meter rentals, notwithstanding the fact that the rates had been reduced. The net profit showed an increase of over £70,000 and the company was placing to various reserve accounts a total of £560,000. The sum carried forward had been

reduced as the new Act obviated the necessity of carrying forward the usual large amount. The increase in working costs was mainly due to rates and taxes, but the price of coal was lower, and he emphasised that last year's costs received practically no benefit from the new Barking station. The output of energy increased by over 15 million kWh and the total output was now approaching the 100 million kWh mark. The applications for supply amounted to 25,187 kW, including bulk and railway supplies, making the total connected load over 166,000 kW. The most satisfactory feature about the new business was the growth of bulk and railway supplies, which, in future, would form an important factor in the development of the business. Dealing with the Barking power station, the chairman said that additional capital expenditure amounting to £970,000 had been incurred during the year. The station was opened by the King in May last. It naturally took some time to get the station in proper operation; they had had some trouble with the 33,000-V transmission lines connecting the station with the London area, but those difficulties had now been largely overcome, and the company would have all the equipment available necessary to meet the heavy autumn load. Sir Harry then reviewed the position under the London Electricity (No. 1) Act, 1925. He said that the valuation of properties had not yet been fixed, nor the standard price upon which charges to consumers were dependent. In the meantime they were carrying out in practice the object of the Act by interconnecting the generating stations of the companies in the group, and by the giving and taking of bulk supplies. In furtherance of the same policy, interconnecting mains were being laid between the Barking station and the generating stations of the Kent Electric Power Co. and the North Metropolitan Electric Power Supply Co. He was afraid that he was not in a position to throw much light upon the Government's electricity proposals owing to the shortness of time allowed him for the study of the Bill. He did not know whether the Barking power house was to be a "selected" station under the Bill, but they were entitled to conclude that the company and other London supply companies would remain unaffected, seeing that the London situation was settled under the Acts of last year. He was in sympathy with any scheme which had for its object the provision of a cheap supply in bulk—a matter which was long overdue—but it was by no means clear that the Government scheme would provide a cheap supply. Bulk supply was of vast importance to small undertakings, and he could not understand how any such undertaking could refuse to take it, if it was available on reasonable terms and conditions. Bulk supply had converted struggling profitless undertakings into prosperous profit-earning ones. He deprecated the imaginings of journalists which misled the public with regard to the electricity situation, and particularly condemned the common error that the best site for a power station was at the pit's mouth. Such misleading effusions were not likely to assist in the least degree in understanding the very difficult technical problem now before the country. Looking ahead, Sir Harry said that they were justified in anticipating another successful year; the new business secured to date considerably exceeded the corresponding figure for last year, and the works costs so far showed a satisfactory reduction. They had extended their area of supply by some 24 square miles, and were further reducing the rates to consumers. In conclusion, the chairman referred to the appointment of Mr. Archibald Page as general manager, with a seat on the board, and that of Mr. Hobson as joint manager of the company.

Clyde Valley Electrical Power Co.

This company's report was reviewed in our issue of March 19th (p. 472). The annual meeting was held on March 24th. Mr. R. Robertson presided in the absence of Sir Frederick Gardner (chairman) and the deputy-chairman, and in the course of his speech said that the report was highly satisfactory and attested the vigour with which the area was being developed. Extensions in various directions had been proceeding steadily, and during the current year they would be in a position to supply electricity to Helensburgh, Cardross, Vale of Leven, Kirkintilloch, Lanark, Carluke, Kilmacolm, and Bridge of Weir. The company now had over 600 miles of e.h.p. and l.p. mains and 253 sub-stations in operation, and there were eight sub-stations in course of erection. The financial position of the company was sound, and if left to themselves, without undue Government interference, they could look forward to the future with confidence. They had successfully resisted an attempt by the Glasgow Corporation to infringe their rights and they hoped that all contentious matters between the company and the Corporation had now been settled. Mr. Robertson then turned to the Government's Electricity Bill, and said that the company was one of those authorities with a non-standard frequency. He considered that the estimate of eight million pounds as the cost of standardising frequency was far too low. It would, moreover, inevitably increase the cost of electricity to the consumers for many years. While the contemplated expenditure of £33,500,000, if carried out with due regard to economic considerations, would ultimately effect a saving in generating costs, it was inevitable that the immediate burdens would fall most heavily upon the districts served by the owners of "selected" stations. The period of guarantee was totally inadequate, as the charges for interest and sinking fund on the large capital expenditure were not to become effective for the first five years. The scheme appeared to be based upon certain estimates prepared for the Weir Committee, showing the probable results of the scheme over a series of years. So far as the West of Scotland was concerned, those figures were extremely optimistic; if they were not fulfilled, the expected economies would not be fully realised. In conclusion, Mr. Robertson said that the goal which it was hoped to reach, in 1940 or thereabouts, was an average rate to consumers of 1d. per kWh. The company's average rate last year was 0.889d., and in view of the reduction in the price of coal a still lower figure should be reached during the current year.

Newcastle-upon-Tyne Electric Supply Co., Ltd.

Mr. R. P. Sloan (chairman and managing director) presided at the annual meeting on March 23rd. In moving the adoption of the report (*vide* our last issue, p. 510), Mr. Sloan said that the outlook in the more important industries on the North-East Coast was still far from bright, but in spite of the depression the company had not only maintained its position, but had to some extent improved it by the exercise of economies and steady development. Last year's profit showed an increase of over £41,000, which in the circumstances could be considered satisfactory. The horse-power connected amounted to 27,842—only 1,840 h.p. less than was connected in the previous year. This was also satisfactory, in view of the prevailing adverse conditions. In 1924, 3,200 new customers were connected up and in 1925, 5,812. They hoped to reach a total of 12,000 during the current year, and the number of applications received so far indicated that that figure would be reached. Upon the whole he considered the outlook brighter to-day than it was 12 months ago. Referring to the Government's electricity scheme, the chairman said that he regretted that the public had been misled by wild statements made by politicians and others with little experience of the difficult problems involved. There was no short cut to the cheapening of supply; a scheme on the lines contemplated might, in time, result in certain economies being effected, many of which would, in the ordinary course, have been effected in any case, but he was afraid that if they had to rely merely upon any such scheme, the process of cost reduction would be very slow, and much disappointment would result. The only way of bringing about any substantial reduction of costs to consumers lay in the consumers' own hands to a much greater extent than it did in the hands of electricity supply authorities or the Government. It was only by consumers making greater use of the capital invested—by increasing their individual consumption of electricity—that any substantial reduction of cost could be brought about. The general scheme outlined in the Bill closely resembled that which had been developed by the company on the North-East Coast during the past 25 years. Its application to the country as a whole would raise many difficult problems. The high state of electrical development that had been reached on the North-East Coast had only been possible because those responsible had had absolute control over generation. In the Government scheme it was proposed to take away this control and place it in the hands of a board having executive powers. This appeared to be a substantial step towards nationalisation of all electrical energy produced by supply authorities. He was satisfied that if the Government's Bill was not amended and was passed into law in its present form, future development would be very seriously hampered. If a system of high-pressure transmission mains throughout the country was provided, he earnestly hoped that power companies would be allowed to retain control of generation within their own areas. That, in his opinion, would remove one of the strongest objections to the proposals contained in the Bill. The report and accounts were adopted.

Folkestone Electricity Supply Co., Ltd.

Presiding at the annual meeting on March 26th, the chairman (Alderman George Spurgen, J.P.) said that a satisfactory number of new consumers had been added during the year, and the demand had reached a record figure. The main part of the work of bringing the undertaking in line with the most modern practice, both as regarded generation and transmission, had been practically completed. It was hoped that before the next meeting the company's undertaking would be linked up with that of the Dover Corporation in accordance with the instructions of the Electricity Commission. The latter's sanction had been obtained to the installation of a further 3,000-kW set, and an order for that had been placed with the Brush Electrical Engineering Co., Ltd. The directors felt that the broad principle of the Government's Electricity Bill was a sound one, and should eventually lead to considerable economies. The chairman also mentioned the institution of a co-partnership system by which employés could become shareholders in the company. In conclusion he said that the future for the company appeared to be bright.

Midland Electric Corporation for Power Distribution, Ltd.

The annual meeting of this company, whose report was reviewed in our last issue (p. 510), was held on March 22nd. Mr. James Taylor, who presided, said that to meet capital commitments 70,000 new ordinary shares were being offered at par to existing shareholders, giving them a substantial bonus. The progress of the company could be gauged from the fact that the energy sold increased during the year from 48 to 55 million kWh. The demand for electricity continued to grow. Their station at Ocker Hill was fully loaded and not capable of further expansion; further supplies would have to be obtained from the West Midlands Joint Electricity Authority. It was to be hoped that that newly-constituted authority

would proceed at once with the provision of additional generating plant; strong representations had been made to the Electricity Commissioners on that matter. Referring to the Government's Electricity Bill, Mr. Taylor said that the directors were carefully considering its provisions, and while not desiring to do anything to obstruct the improvement of electricity supply in this country, were taking steps to protect the company's interests. A staff benefit fund had been created and a total of £16,954 (including £12,000 provided last year) was being handed over to the trustees of the fund. The report and accounts were adopted, and at a subsequent extraordinary meeting the institution of the staff benefit fund was approved.

West London and Provincial Supply Co., Ltd.

The annual meeting was held on March 24th under the chairmanship of Mr. Harry Kahn, who, in the course of his speech, referred to the death of two directors, Sir T. Brooke-Hitching and Mr. M. Hansell. Turning to the accounts, he said that the Chiswick Electricity Supply Corporation had declared a dividend of 16 per cent., as compared with 15 per cent. in 1924. The West London Company was paying the preference dividend and the directors recommended that 7½ per cent. should be paid on the ordinary shares, that £5,000 should be transferred to reserve, and that £2,379 should be carried forward. Proceeding, the chairman said that the company's holdings consisted almost entirely of its interest in the Chiswick Corporation. Now that the financial position had improved and they had been able to inaugurate a reserve fund, it was considered that their investments should be extended in other directions. The directors were accordingly drawing up a scheme which would improve the status of the company and consequently the shareholders' investment in it. They also aimed at dealing with the method of marketing the company's shares, and taking steps to place the company among the recognised trust companies of the City.

Pinchin, Johnson & Co., Ltd.

In the course of his speech at the annual meeting on March 23rd, the chairman (Mr. E. Robson) said that 1925 was a record year, although there was a slight drop in the net revenue, owing to the non-recurrence of certain items which appeared in the 1924 accounts. They had had to carry in the past year's accounts a fairly heavy depreciation on account of Continental exchanges, and in addition conditions in the Far East had militated against the obtaining of normal results in that particular market. All other sections of the business showed substantial increases in spite of the existing adverse conditions. Considerable progress had been made towards the completion of the new factory adjacent to their Silvertown works. That extension had considerably increased the company's efficiency. The outlook for the present year was a very encouraging one from many points of view, and the sales from January 1st onwards had been satisfactory. The report and accounts were adopted.

City of London Electric Lighting Co., Ltd.

An extraordinary general meeting was held on March 24th. Mr. J. B. Braithwaite, the chairman, explained that until an agreement had been arrived at with the London County Council, under the Act of 1925, a statement of accounts in the customary form would be of little value, and the shareholders would probably prefer to await a balance sheet showing the financial position of the company under the Act. The board was satisfied, however, that the profits for 1925 were sufficient to permit of the payment of the preference dividend and of a dividend at the rate of 15 per cent. upon the ordinary shares. This was approved by those present and at a subsequent meeting resolutions authorising the alteration of the articles of association were passed.

Automatic Telephone Mfg. Co., Ltd.

The directors' report for 1925, which we briefly mentioned in our last issue, shows a profit of £163,325 for the year, to which is added £15,755 brought forward, making £179,080. After meeting debenture interest, preference dividend, &c., and allocating £50,000 for depreciation and £20,000 to general reserve, there remains a balance of £87,408. A dividend of 10 per cent. is recommended and a balance of £37,804 is to be carried forward. Steady production on a large scale has been maintained throughout the year, causing a satisfactory increase in the profit earned and enabling the directors to make substantial allocations to reserve and depreciation. The outstanding £210,000 6½ per cent. debentures were repaid during the year. Meeting: April 7th.

German Companies.

The report of the *Robert Bosch Gesellschaft*, Stuttgart, makers of magnetos and electrical equipment for motor vehicles, shows a net profit for last year of £397,142, out of which a dividend of 8 per cent. is being paid on a capital of £1,500,000. This result has been achieved notwithstanding the fact that part of the works was on short time during the twelve months. It is stated that 80 per cent. of the output of magnetos is exported to other countries.

The *Concordia Electricity Company*, Dusseldorf, states that the expected improvement in business did not take place in 1925. After defraying general expenses the accounts show net profits of 239,000 marks, permitting of the payment of a dividend at the rate of 5 per cent.

The *German Telephone and Cable Industry Company*, Berlin, has declared a dividend at the rate of 6 per cent. for 1925. At the recent annual meeting it was mentioned that the invoiced turnover largely increased last year as well as the stock of orders. Business in the current year had so far been satisfactory, the further development depending upon what funds the authorities would have available for the extension of the telephone network and the conversion of the exchanges to the automatic system.

The *Electricity Supply Company*, Berlin, which owns or is indirectly interested in various undertakings, states that there was no diminution in the demand for energy in 1925, the falling off in some cases having been compensated for by new connections and increased use of plant in other instances. The net profits for 1925 amount to 2,080,000 marks, as against 1,750,000 marks in the previous year, the dividend being at the rate of 9 per cent., as compared with 8 per cent. in 1924.

The *Electricity Company* (*late Schuckert*), Nuremberg, reporting on the situation of the undertakings in which it is interested, states that a declining tendency was manifested in 1924-25 in the turnover of the manufacturing companies and the supply works and the traffic on the tramways, and the company's contracting and financing branches were inactive owing to the scarcity of capital. It was therefore necessary to restrict activity to the maintenance and development of the existing undertakings.

French Companies.

The *Société Française des Electrodes*, of Lyons, proposes to pay a dividend at the rate of 50 fr. per share for 1925 out of net profits of 1,638,000 fr., as compared with 1,686,000 fr. in 1924, when the same dividend was paid.

The *Compagnie du Bourbonnais* (*P. de Lachomette, Villiers et Cie.*), of Lyons, which has a share capital of 28,500,000 fr., reports net profits of 7,109,000 fr. for 1925 as against 6,032,000 fr. in the previous year. It is proposed to pay a dividend of 20 fr. per share.

La Société des Constructions Electriques de France, Paris, is increasing its capital to 100 million fr.

Swiss Company.—The *Oerlikon Accumulator Works Co.*, of Zurich, reports net profits of 700,000 fr. for 1925 as compared with 650,000 fr. in the previous year; the dividend is again 20 per cent.

Danish Company.—The *Copenhagen Telephone Co., Ltd.*, has proposed a dividend of 8 per cent. for 1925, as in previous years.

Chelsea Electricity Supply Co., Ltd.—Mr. W. R. Davies (chairman) presided at the annual meeting on March 24th, and in presenting the report and accounts (ELEC. REV., March 19th, p. 473) referred to the death of Major Woods, a director, and the appointment of Mr. P. D. Tuckett in his place. He said that the company had now come to the end of its period of independence. Although they had been able to pay a dividend of 12 per cent. for the past two years, the dividend during the 37 years of the company's existence had only averaged 5.2 per cent. The amount of the free reserves which could be capitalised and the standard price to consumers had not yet been fixed. They were anxious to have these matters settled as soon as possible to enable them to make a reduction of their charges, which should be substantial. They had decided, in the meantime, to reduce their maximum charge from 7d. to 6½d. per kWh.

Direct Spanish Telegraph Co., Ltd.—The report for 1925 states that the balance available, including the sum brought forward, amounts to £10,678. The 10 per cent. preference dividend absorbs £3,000; a dividend of 10 per cent., free of tax, is paid on the ordinary shares (£6,465); and a balance of £1,213 is carried forward. The traffic receipts showed a decrease of £8,824. During the year the company's Porthcurnow-Bilbao cable was interrupted for two days, and was repaired by the Telegraph Construction & Maintenance Co., Ltd. An issue of £100,000 4½ per cent. debentures was made, and the new cable was laid and opened for traffic on September 8th last. New overhead lines have been erected between the landing place, Arrigunaga, and Bilbao. Meeting: April 15th.

Hastings and District Electric Tramways Co., Ltd.—The annual meeting was held on March 23rd under the chairmanship of Mr. G. T. Moody. The chairman said that a substantial increase in the number of passengers had been accompanied by a decrease in the revenue. Fortunately the expenditure was lower, but the net result only enabled them to pay 2½ per cent. upon the ordinary shares—a totally inadequate return. The undertaking was heavily rated and further relieved the rates by the amount of road maintenance which it was forced to carry out. The Hastings Corporation had proposed to run competing transport services, but the proposal was rejected by the ratepayers. They regretted that their friendly attitude towards the Council had not been reciprocated.

Slough and Datchet Electric Supply Co., Ltd.—The report for the past year shows a profit of £21,261 (including £4,348 brought forward). After providing for depreciation, &c., it was proposed to pay a final dividend of 6 per cent. (making 10 per cent. for the year) together with a bonus of 4 per cent. The 15,000 new shares rank for dividend from January 1st, 1925, on 10s. per share, and from July 1st, 1925, on £1 per share. A balance of £6,150 is carried forward. The extension of the company's mains to Burnham has been attended with satisfactory results, and the company has applied for powers to extend its mains to Hitcham, Dorney, Boveney and Eton Wick.

Costa Rica Electric Light and Traction Co., Ltd.—The net earnings of the company in Costa Rica increased from £26,277 to £27,808 in 1925, but the net profit fell from £9,339 to £8,906. The board has entered upon considerable expenditure upon additional plant and renewals. Five new cars have been purchased and placed in commission, and a new 1,200-kW turbo-generator is being installed. These items will cost £30,000, and accordingly the directors have again placed the balance of net profit for the year to the depreciation and renewals account. The meeting was held on Wednesday last.

London Electric Wire Co. & Smiths, Ltd.—The directors' report for 1925 states that during the year the business of the company was restricted by trade depression, and a large proportion of the business was done at a very small margin of profit. The directors had made an addition of £25,000 to the special reserve account to provide against special contingencies. The preference dividend has been paid and the directors recommend a final dividend of 6¼ per cent. on the ordinary shares, making 7½ per cent. for the year, leaving £35,918 to be carried forward. The meeting was held on Wednesday last.

Stewarts & Lloyds, Ltd.—The annual meeting was held on March 26th. Mr. R. M. Wilson, who presided, said that last year proved to be one of the worst which the iron and steel trade had ever experienced; the competition at home and abroad became greater and showed no signs of decreasing. Indeed, it was likely to become worse. In spite of the adverse circumstances, however, the company had increased its sales. Two of the large works had been remodelled and brought up to date.

Windsor Electrical Installation Co., Ltd.—The profit for the past year (including £3,648 brought forward) was £17,553. After providing for depreciation, debenture interest, preference dividend, &c., there remains a balance of £11,308. It was proposed to pay a final dividend of 6 per cent. on the ordinary shares (making 10 per cent. for the year) and a bonus of 4 per cent., leaving £5,752 to be carried forward.

Greengate and Irwell Rubber Co., Ltd.—The net profit for the past year amounted to £80,186 and the addition of £22,719 brought forward gives an available balance of £102,905. It is proposed to pay a final dividend of 1s. 2d. per share, making 2s. per share (12½ per cent.) for the year, as against 2s. 3d. in 1924, to place £10,000 to reserve, and to carry forward £27,279.

Thames Valley Traction Co., Ltd.—The balance available for the past year's working, after adding £2,538 brought forward and transferring £668 to reserve, was £7,588. A dividend of 6 per cent. is being paid on the ordinary shares (against *nil* for 1924), and £3,088 is carried forward. The directors propose to increase the capital from £75,000 to £100,000.

Browett, Lindley & Co., Ltd.—The directors report that during 1925 it was found impossible to secure sufficient work for the shops, and although economies were effected, the net result was a deficiency of £16,692, which is only partly met by the balance of £3,381 brought forward. So far this year orders have been more plentiful, but prices are very low owing to competition.

Companies to be Struck off the Register.—The names of the undermentioned companies will be struck off the Register at the expiration of three months, unless cause is shown to the contrary :—

Amalgamated Radio-Telegraph Co., Ltd.
City Electric Welding Co. (Newcastle), Ltd.
Egyptian Power and Nitrogen Syndicate, Ltd.
Electrical Development and Finance Corporation, Ltd.

Stock Exchange Notices.—The undermentioned have been ordered to be officially quoted :—

Midland Counties Electric Supply Co.—250,000 ordinary shares of £1 each, fully paid, Nos. 1,000,001 to 1,250,000, and 250,000 six per cent. cumulative preference shares of £1 each, fully paid, Nos. 1,000,001 to 1,250,000.
Shawinigan Water and Power Co.—$1,179,600 capital stock.

Brown Bros., Ltd.—In the course of his speech at the annual meeting on March 26th, Mr. W. Dickison (chairman) said that a dividend of 7½ per cent. was recommended on the ordinary shares. The company's radio branch had proved a useful addition to its activities.

Scottish Tube Co., Ltd.—Out of a balance of £61,023 for 1925 (including £16,539 brought forward) the directors propose to pay a dividend of 4 per cent. on the ordinary shares and to carry forward £15,967.

Stocks and Shares.

MONDAY EVENING.

THE principal event this week in the world of electricity is, of course, the debate on the second reading of the Electricity (Supply) Bill, around which a lively degree of interest has become quickened. The Bill is forming now the focus of political discussion, and, having been put into the political window, it attracts thereby attention from people who in the ordinary way would have regarded the business as much too abstruse and technical for them to attempt to understand. Having been definitely stamped with the label of Socialism by one party and non-Socialism by another, the Bill suddenly assumes a position of first-class importance. The technical mind must be amused, the non-technician surmises, at some of the lay criticisms that are levelled from both sides.

From the purely Stock Exchange point of view, the effect of the hubbub is comparatively slight. The tendency is to let prices droop, but none of the London shares are affected. Proprietors are evidently content to await the course of developments, and to pin their expectation to the future rewarding them with the same dividends as they now receive. For this reason, the price-list is almost unchanged, though some of the provincial shares are a little weaker. Clyde Valleys have gone back to 28s. 6d., Midland Counties to 20s., and Yorkshire Electrics are dull at 25s. 6d. In the London list, Westminsters receded to 43s. 9d. and Edmundsons preference to 22s., but apart from these, no alterations have occurred.

Sharp advances are marked in Metropolitans and in Districts. The latter have jumped 3 points to 50, while Metropolitans are 1½ higher at 66½. London Electric ordinary at 47 is 2 up. The Central London stocks are a little better, but show no quotable changes. In the Underground group there has been a reaction after the material improvements of a week ago. The £10 shares lost 2s. 6d. out of their half-a-sovereign rise and Bus "A" shares eased off to 10s. The 6 per cent. income bonds are left at 100. To explain the rise in Districts it is pointed out that this railway is more intimately connected with the Undergound than is the Metropolitan, and that the benefits expected to accrue to the former through the acquisition by the L.G.O.C. of eight private omnibus concerns are likely to be reflected in the District's profits. Metropolitans pay a very fair yield on the money, considering the prospects that the company possesses of being absorbed into one of the other groups in the future. The rise in London Electric ordinary stock has come about as a result of a little inquiry upon a market in which it is very rarely that stock changes hands at all. Nothing fresh has occurred in the British Electric Traction or the London Tramway stocks.

Marconis have responded to the better tone (which we mentioned last week as being in evidence) by a rise to 23s. 9d., the improvement being due to the unexpectedly good showing made by the Marconi Marine, shares in which latter concern remain at £1. Other wireless shares keep steady. A statement has been issued by Pettigrew & Merriman, the price of whose ordinary shares, 5s. fully-paid, is no better than 2s. 6d. The 7½ per cent. preference, with 15s. paid, stand at 6s. The directors state that in spite of the acute depression in the wireless industry, which the company has had to share with all others, its finances give no cause for anxiety. They will cause interim accounts to be prepared up to the end of June next. The company started business as from the end of October last.

Automatic Telephones maintain their rise at 51s. 3d., and Internationals are steady at 44s. The London Electric Wire Company and Smiths announce a profit for last year of £72,500, a decrease on the previous 12 months of about £18,000. The dividend is maintained on the ordinary at 7½ per cent., and the price of the 7½ per cent. preference shares is 24s. The ordinary are not quoted.

Amongst the newly-issued stocks, London Power 5 per cent. debenture strengthened to 96½ bid, which is not surprising in view of the gilt-edged character of the security. South London Electric 5 per cent. debenture stock is better at 96, and most of the purely investment securities hold their prices. American Telephones went back to 150, and Radio Corporations come weak from New York, the common being no better than 7. The preferred keep about 9½. Canadian Marconis are listless at 4s. 1½d. All the little interest that was aroused not long ago in the latter shares has evaporated; the price has come back, it will be observed, to about the level at which the recent offer of new capital was made.

Anglo-American deferred stock has recovered to 23¾, but the cable group as a whole is very quiet, and nothing of consequence has happened. Callenders dropped to 75s., to rally to 76s. 3d. British Aluminiums are better at 41s. 3d., and British Insulated hold their rise at 3¼. Siemens at 31s. 3d. have gone back a little. India Rubber shares at 23s. are 9d. down.

Anglo-Argentine Tramways shares are dull, the second preference in particular being weak at 2½. The company is said to be faced with severe 'bus competition, but, besides this, some doubt is expressed as to whether the reported arrangement reached between the Municipality of Buenos Aires and the Anglo-Argentine Tramways Company has been converted into a permanent agreement. It would be useful to hear an authoritative statement upon this point, in order to answer the uneasy questionings of shareholders who are disturbed at the dwindling of the share-prices. Brazilian Tractions are a little lower, and other parts of the traction market present no points of fresh interest.

The engineering section is a shade better, with trifling recoveries in some of the better class iron and steel shares. In the rubber share market activity is checked not only by the close approach of the Easter holidays, but also by the reaction which has taken place in the price of the raw material from 2s. 7d. a lb. to the neighbourhood of 2s. 5d. per lb. New issues from several of the companies connected with the electrical industry are declared by gossip to be in course of preparation. No important offers are likely to be announced until after Easter.

Share List of Electrical Companies.

Home Electricity Companies.

	Nom. £	Dividend. 1924	Dividend. 1925.	Price Mar. 29. 1926.	Rise or fall.	Yield. p.c.
Bournemouth and Poole	1	14	—	60/9	—	4 13 4
Brompton Ordinary	1	10	10	1½	—	*5 18 6
Charing Cross Ordinary	1	14½	15	45/9xd.	—	6 11 2
do. do. 4½ Pref.	1	4	4½	17/-	—	5 5 11
Chelsea	1	12	12	24	—	5 12 11
City of London	1	15	15	45/9	—	6 11 2
do. do. 6% Pref.	1	6	6	22/6	—	5 6 8
Clyde Valley	1	8	8	28/6	—1/-	5 12 8
County of London	1	15	15	£0/-	—	5 0 0
do. do. 6 % Pref.	1	6	6	22/-	—	5 9 1
Edmundson's Ordinary	1	7	7	23/6	—	5 19 2
do. 7% Pref.	1	6	7	22/-	—6d.	6 7 3
Elec. Supply Corporation	1	10	10	32/6	—	6 3 0
Kensington Ordinary	5	15	15	13⅝xd.	—	5 9 1
Lancs. Light and Power	1	7½	7½	26/-	—1/-	5 11 1
London Electric	1	10	10	32/-	—	6 5 0
do. do. 6% Pref.	5	6	6	5⅜	—	5 11 7
Metropolitan	1	11	11	58/3	—	5 15 0
do. 4½% Pref.	1	4½	4½	17/-	—	5 5 11
Midland Counties	1	5½	6	20/-	—1/6	6 0 0
Newcastle-on-Tyne Ordinary	1	7	7	23/9	—	5 17 11
do. 5% Pref.	1	5	5	18/9	—	5 6 8
do. 7% Pref.	1	7	7	25/-	—	5 12 0
Notting Hill 6% Pref.	10	6	6	9½	—	6 6 4
North Met. Elec. 6% Pref.	1	6	6	22/6	—	5 6 8
St. James' and Pall Mall	5	17½	17½	12¾	—	5 13 10
South London	1	15	15	27⅛	—	5 17 1
South Metropolitan Pref.	1	7	7	25/6	—	5 9 10
Urban Ordinary	1	4	4	19/6	—	4 2 1
do. 6% Pref.	1	6	6	1	—	6 0 0
Westminster Ordinary	1	15	15	43/9	—⅛	6 17 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	20/-xd.	—	7 10 0
Yorkshire Elec.	1	8	8	25/6	—3/6	6 5 6

Home Rails.

Central London Ord. Assented	Stock	4	4	68	—	5 17 8
Metropolitan	,,	5	5	66½	+1½	7 10 5
do. District	,,	9½	9½	£0	+8	7 0 9
Underground Electric Ordinary	10	Nil	Nil	3	—⅛	Nil
do. do. "A"	1/-	Nil	Nil	10/-	—6d.	Nil
do. do. Income	Bonds	6	6	100	—	*6 0 0

Telegraphs and Telephones.

		Dividend. 1923.	Dividend. 1924.			
Anglo-Am. Tel. Pref.	Stock	6	6	102	—	5 17 8
do. Def.	,,	1½	1½	23½	+¼	6 6 4
Automatic Telephone	1	3	6	51/3	—	3 17 10
Chili Telephone	5	6	5	6¼	—	*3 12 9
Cuba Sub. Ord.	10	5	5	6⅞	—	7 8 2
Eastern Extension	10	10	10	18	—	*5 11 1
Eastern Tel. Ord.	Stock	10	10	177½	—	*5 12 8
Globe Tel. and T. Ord.	10	10	10	17⅞	—¼	*5 12 8
do. do. Pref.	10	6	6	10⅜xd.	—	5 11 7
Great Northern Tel.	10	22	22	32	—	6 17 6
Indo-European	25	7	8½	45½	—	*4 13 5
Marconi	1	10	10	21/16	+1/16	8 8 6
Marconi Marine	1	10	7½	20/-	—	7 10 0
Oriental Telephone Ord.	1	12	12	2 1/16	—	*5 16 4
United R. Plate Tel.	5	8	8	7⅛	—	*5 1 7
Western Telegraph	10	10	10	17½xd.	—	*5 15 11

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref.	5	5½	5½	3 1/16	—	8 19 6
do. do. 2nd Pref.	5	6	6	2½	—1/16	12 0 0
do. do. 5% Deb.	Stock	5	5	73½	—	6 16 3
British Electric Traction Ord.	,,	8	8	122½	—	4 18 0
do. do. 6% Pref.	,,	6	6	107	—	5 12 2
Brazil Traction	100	4	4	91½	—1	5 9 3
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	84½	—	5 18 4
do. do. Preferred	,,	96/-	96/-	104½	+1	*4 10 1
do. do. Deferred	,,	129/5	129/5	127	—	*5 2 7
do. do. Deb.	,,	4½	4½	75	—2	5 13 4
London & Sub. Trac. 5% Pref.	1	2½	Nil	5/6	—	Nil
London United Tram. Deb.	Stock	4	4	48	—	8 6 8
Mexico Trams, 5% Bonds	—	5	5	61½	+1	8 2 8
Mexican Light Common	100	Nil	Nil	32½	—	Nil
do. Pref.	100	Nil	Nil	62½	—	Nil
do. 1st Bonds	—	5	5	68½	—	7 6 0
Yorkshire (West Riding)	1	5	—	14/-	—	7 2 10

Manufacturing Companies.

Babcock & Wilcox	1	12	12	53/9	—	*4 9 4
British Aluminium Ord.	1	5	10	41/3	+9d.	4 16 5
British Elec. Transformer Pref.	1	Nil	7	20/9	—	6 14 11
British Insulated Ord.	1	15	15	3½	—	4 18 4
Brush Ord.	1	10	10	26/3	—	7 12 4
Callenders	1	15	15	3 1/16	—	4 14 10
do. 6½% Pref.	1	6½	6½	22/6	—	5 15 7
Crompton Ord.	1	Nil	Nil	16/9	—	... ...
Edison-Swan	4/-	10	10	8/6	—	4 14 1
do. 5% Deb.	Stock	5	5	83	—	6 0 6
Electric Construction	1	10	10	12/6	—	6 3 1
Enfield Cable, Pref.	1	7½	7½	1¼	—	6 0 0
English Electric	1	5	5	19/0	—	5 5 3
do. do. Pref.	1	6	6	19/-	—6d.	6 6 4
Gen. Elec. Pref.	1	6½	6½	23/6	—	5 10 8
,, Ord.	1	5	7½	31/3	—	4 16 0
Henley	1	15	16	3⅜	—	4 5 4
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	5	5	23/-	—9d.	*4 6 11
Johnson & Phillips	1	10	10	3	—	3 6 8
Met.-Vickers Ord.	1	8	8	26/3	—	6 1 11
do. Pref.	2	8	8	2⅞	—	6 11 3
Siemens Ord.	1	—	7½	1⅞	—9d.	4 16 0
Telegraph Construction	12	20	10	28½xd.	—	*4 4 8

*Dividends paid free of Income Tax.

Market Quotations for Chemicals and Metals.

It should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general and they may vary according to quantities and other circumstances.

CHEMICALS, &c.		Price March 30th.	Fortnight's Inc. or dec.
a Acid, Oxalic	per lb.	5¾d.	...
a Ammoniac, Sal	per ton.	£60	...
a Ammonia, Muriate (large crystal)	,,	£52	...
a Bisulphide of Carbon	,,	...	...
a Borax	,,	£45	...
a Copper Sulphate	,,	£25 10s.	...
a Potash, Chlorate	per lb.	4d. to 4¼d.	...
a ,, Perchlorate	,,	5¼d.	...
a Shellac	per cwt.	£15 15s.	...
a Sulphur, Commercial	,,	£9 10s.	...
a ,, Roll	,,	£9 10s.	...
a Soda, Chlorate	per lb.	3½d. to 3¾d.	...
a ,, Crystals	per ton.	£5 to £5 5s.	...
a Sodium Bichromate, casks	per lb.	4d.	...
METALS, &c.			
b Aluminium, Ingots	per ton.	£120 to £125	...
b ,, Wire	per lb.	1/9 to 2/6*	...
b ,, Sheet	,,	1/6 to 2/-	...
p Babbitt's Metal and Anti-friction Metal—			...
Grade I	per ton net.	£257	£9 dec.
Grade II	,, ,,	£180	£6 dec.
Grade III.	,, ,,	£98	£4 dec.
c Brass (rolled metal 9" to 12" basis)	per lb.	9¾d.	...
c ,, Tubes (solid drawn)	,,	1/- to 1/0½	...
c ,, Wire, basis	,,	10½d.	...
c Copper Tubes (solid drawn)	,,	1/1	...
c ,, Bars (best selected)	per ton.	£90	...
c ,, Sheet	,,	£90	...
c ,, Rod	,,	£90	...
d ,, (Electrolytic) Bars	,,	£65 5s.	15s. dec.
d ,, ,, Sheets	,,	£144 10s.	...
d ,, ,, Wire Rods	,,	£75 £s.	15/- dec.
d ,, ,, H.C. Wire	per lb.	9 1/16d.	½d. dec.
f Ebonite Rod	,,	2/3 to 2/6	...
f ,, Sheet	,,	2/3 to 2/6	...
n German Silver Wire	,,	2/2	...
h Gutta-percha, fine	,,	6/6	...
h India-rubber, Para fine	,,	2/3	½d. inc.
l Iron Pig (Cleveland Warrants)	per ton.	nom.	...
l ,, Wire, galv. No. 8, P.O. qual.	,,	£21	...
g Lead, English pig	,,	£31 15s.	20/- inc.
g Mercury	per bot.	£14 10s. to £14 15s.	...
e Mica (in original cases) small	per lb.	3d. to 3/-	...
e ,, ,, medium	,,	4/- to 8/-	...
e ,, ,, large	,,	10/- to 20/- & up.	...
p Phosphor Bronze, plain castings	,,	1/3½	...
p ,, ,, drawn bars & rods	,,	1/3	...
p ,, ,, rolled strip & sheet	,,	1/2½	...
p ,, ,, wire	,,	1/3½	...
c Platinum	per oz.	£23 10s.	...
d Silicium Bronze Wire	per lb.	1/-	...
r Steel, Magnet, in bars	,,	7½d.	...
n Tin, Block (English)	per ton.	£280 5s. to £281	£15 10s. to £15 15s. dec.
n ,, Wire, Nos. 1 to 16	per lb.	4/5	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
l Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

The British Association.—The British Association for the Advancement of Science has issued the preliminary programme for this year's meeting at Oxford. This contains information regarding accommodation, lists of officers, and a map and historical details of the city and university. The Prince of Wales will deliver his presidential address on August 4th, and the meeting will continue until August 11th. Some excellent excursions are being arranged to places of interest in the neighbourhood of the city. The meetings of Section G.—Engineering are to be held at the Electrical Laboratory. Sir John Snell, president of the section, will deliver an address on "Electricity Supply: Its Recent and Probable Future Development," on August 6th. The proceedings of the section will include a discussion on "Refrigeration."

A Stand-by Plant Test.—We have received some particulars of an interesting speed-service test which was recently carried out at the Winnipeg hydro-electric generating station in connection with its steam stand-by plant. Without warning to the stand-by crew the main switches were tripped and the water plant shut down, the pulverisers and conveyors for the steam installation automatically ceasing to function. At the sound of the shut-down siren the stand-by men ran up from the storage steam a 1,000-h.p. house turbine, and in 2¼ min. there was sufficient electrical energy developed to start feeding the boilers. The two 7,500-h.p. main stand-by turbines were then warmed up and in 26 min. from the time when the water plant was shut down the steam turbines were on load giving an adequate supply. It is interesting to note that the three steam machines were supplied by Messrs. James Howden & Co., Ltd., Glasgow.

The Electrical Exports of Germany.

WITH the publication of the monthly returns, for December and the twelve months of 1925, of the foreign trade of Germany, some interesting information regarding the progress of the electrical trade of the country can be ascertained. As, however, a number of alterations in the classification were made on October 1st, when the new Customs tariff came into operation, an exact comparison with the results of the previous year is not always possible. In the following table are shown the number of dynamos, motors, converters and transformers of certain specified weights exported during the first nine months of 1925 to the principal destinations, together with the total weight in double centner (= one-tenth of a metric ton) and the value in gold marks. Side by side are given similar figures for the whole of 1924.

	1924. (12 mos.)	1925. Jan.-Sept.
Dynamos, motors, converters and transformers up to 25 kg.	204,412	231,452
Weight (Double centner)	7,689	6,383
Value (Reichsmark)	5,211,000	4,815,000
To Great Britain	14,031	13,939
,, Italy	12,721	10,241
,, Holland	35,630	49,316
,, Austria	13,468	10,456
,, Switzerland	21,930	23,900
Ditto, 25 to 100 kg.	41,444	29,904
Weight (Double centner)	22,548	16,191
Value (Reichsmark)	5,343,000	4,148,000
To Holland	5,037	3,469
,, Argentina	3,182	3,653
,, Brazil	2,602	2,331
Ditto, 100 to 500 kg.	21,394	15,916
Weight (Double centner)	43,356	32,294
Value (Reichsmark)	9,235,000	6,857,000
To Italy	1,034	854
,, Holland	1,307	1,010
,, China	1,074	465
,, Brazil	3,041	2,667
Ditto, over 500 kg.	6,904	4,945
Weight (Double centner)	140,429	115,964
Value (Reichsmark)	20,598,000	18,366,000
To Italy	407	307
,, Holland	406	367
,, Spain	518	345
,, Japan	447	172
,, Brazil	599	415

Since October 1st, 1925, the records of this trade have been further sub-divided according to weight, the total exports from that date until the end of the year being as follows :—

	Number.	Weight. Do. c'tner.	Value. Gold mk.
Up to 10 kg.	76,569	1,484	1,564,000
10 kg. to 25 kg.	6,802	1,153	713,000
25 kg. to 150 kg.	12,217	8,462	2,145,000
150 kg. to 500 kg.	2,688	7,335	1,705,000
500 kg. to 3,000 kg.	1,593	16,941	3,246,000
Over 3,000 kg.	204	17,296	2,597,000

Holland, Austria, and Czecho-Slovakia figure prominently amongst the destinations of machines up to 150 kg. in weight; Italy, Argentina and Brazil are good customers for those from 25 to 3,000 kg., whilst of those over 3,000 kg. 24 went to Argentina, 20 to Italy, 18 to Norway, and 16 to Japan, during the period mentioned.

In regard to the following items a useful comparison can be made :—

	1924. (12 mos.)	1925. (12 mos.)	Inc. or dec.
Armatures and commutators (Double centner)	26,515	24,137	− 2,378
Value (Reichsmark)	5,425,000	5,554,000	+ 129,000
Accumulators, plates, &c. (Double centner)	34,144	40,177	+ 6,033
Value (Reichsmark)	4,645,000	6,354,000	+1,709,000
To Denmark (Double centner)	4,803	6,063	+ 1,260
,, Finland (Double centner)	†	1,068	—
,, Great Britain (Double centner)	895	1,149	+ 254
,, Holland (Double centner)	4,225	5,360	+ 1,135
,, Sweden (Double centner)	7,788	14,887	+ 7,099
Galvanic batteries and parts and heating elements (Double centner)	40,690	53,928	+ 13,238
Value (Reichsmark)	7,230,000	10,452,000	+3,222,000
To Great Britain (Double centner)	16,255	25,355	+ 9,100
,, Holland (Double centner)	4,129	6,625	+ 2,496
,, Sweden (Double centner)	5,311	6,894	+ 1,583
Electric cable (Double centner)	230,567	344,163	+ 113,596
Value (Reichsmark)	21,526,000	35,971,000	+14,445,000
To Denmark (Double centner)	†	15,123	—
,, Great Britain (Double centner)	†	8,174	—
,, Italy (Double centner)	†	26,083	—
,, Holland (Double centner)	41,447	109,686	+ 68,239
,, Norway (Double centner)	35,176	28,864	− 6,312
,, Poland (Double centner)	21,262	24,870	+ 3,608
,, Argentina (Double centner)	20,737	34,966	+ 14,229
Electric safety and signalling apparatus (Double centner)	10,172	8,967	− 1,205
Value (Reichsmark)	5,632,000	6,076,000	+ 444,000
To Denmark (Double centner)	573	568	− 5
,, Great Britain (Double centner)	2,796	1,536	− 1,260
,, Italy (Double centner)	302	652	+ 350
,, Holland (Double centner)	641	904	+ 263
,, Austria (Double centner)	166	637	+ 471
,, United States (Double centner)	1,295	650	− 645
Insulating material of asbestos, mica, and micanite (Double centner)	1,035	613	− 422
Value (Reichsmark)	940,000	850,000	− 90,000
To Great Britain (Double centner)	†	93	—
Insulating tubes of paper or cardboard (Double centner)	17,764	24,840	+ 7,076
Value (Reichsmark)	1,672,000	2,508,000	+ 836,000
To Russia (Double centner)	†	3,477	—
,, Sweden (Double centner)	†	4,644	—
Telephone material (Double centner)	8,613	10,052	+ 1,439
Value (Reichsmark)	12,421,000	17,980,000	+5,559,000
To Holland (Double centner)	807	725	− 82
,, Switzerland (Double centner)	619	789	+ 170
,, Japan (Double centner)	†	1,817	—
Measuring and recording instruments (Double centner)	42,809	39,171	− 3,638
Value (Reichsmark)	30,566,000	31,564,000	+ 998,000
To Great Britain (Double centner)	†	1,704	—
,, Italy (Double centner)	6,639	5,284	− 355
,, Holland (Double centner)	3,809	3,795	− 14
,, Russia (Double centner)	5,077	2,468	− 2,609
,, Sweden (Double centner)	2,752	1,998	− 754
,, Spain (Double centner)	1,458	1,786	+ 328
,, Czecho-Slovakia (Double centner)	1,468	1,686	+ 218
,, Japan (Double centner)	5,665	5,371	− 294
,, Argentina (Double centner)	2,225	2,271	+ 46
Metal filament lamps (Hundreds)	512,328	558,205	+ 45,877
Weight (Double centner)	11,934	12,676	+ 742
Value (Reichsmark)	22,078,000	25,470,000	+3,392,000
To Denmark (Hundreds)	28,500	30,002	+ 1,502
,, Finland (Hundreds)	18,310	16,879	− 1,431
,, France (Hundreds)	18,580	12,438	− 6,142
,, Gt. Britain (Hundreds)	40,030	68,464	+ 28,434
,, Italy (Hundreds)	39,600	51,298	+ 11,698
,, Norway (Hundreds)	10,130	15,950	+ 5,820
,, Austria (Hundreds)	29,700	25,037	− 4,663
,, Russia (Hundreds)	9,400	31,099	+ 21,699
,, Sweden (Hundreds)	33,982	35,596	+ 1,614
,, Switzerland (Hundreds)	11,598	15,157	+ 3,559
,, Czecho-Slovakia (Hundreds)	19,164	33,933	+ 14,769
,, China (Hundreds)	20,377	13,214	− 7,163
,, Argentina (Hundreds)	12,110	11,878	− 232
,, Brazil (Hundreds)	12,443	23,362	+ 10,919
,, United States (Hundreds)	52,705	25,536	− 27,169

†Unspecified

	1924. (12 mos.)	1925. (12 mos.)	Inc. or dec.
Wireless material (Double centner)	16,941	31,230	+ 14,289
Value (Reichsmark) ...	19,207,000	29,566,000	+10,359,000
To Denmark (Double centner)	321	915	+ 594
,, Great Britain (Double centner)	9,858	17,640	+ 7,782
,, Holland (Double centner)	775	1,478	+ 703
,, Sweden (Double centner)	1,186	1,781	+ 595
,, Japan (Double centner)	—	1,902	+ 1,902

The remaining items are not wholly comparable, for the reasons stated.

	1924. (12 mos.)	1925. (Jan.-Sept.)
Heating and cooking apparatus (Double centner)	12,204	9,278
Value (Reichsmark)	5,399,000	4,635,000
To Great Britain (Double centner) ...	601	683
,, Holland (Double centner)	1,741	1,344
,, Argentina (Double centner) ...	1,045	575

[From October 1st until the end of the year, electric irons, formerly included in the above heading, have been shown separately. Exports during the period were 708 Double centner, value 184,000 Reichsmark.]

Electrical apparatus for lighting, power transmission, electrolysis, resistances, &c. (Double centner)	213,369	156,178
Value (Reichsmark)	65,146,000	53,749,000

[Ignition apparatus (excluding magnetos) and electrical equipment for motor-cars, formerly included in the above heading, have been shown separately since October 1st. From that date until end of December exports were 3,241 double centner, value 3,739,000 Reichsmark.]

Electrical, medical or dental apparatus (excluding from Oct.-Dec., 1925, Röntgen tubes weighing 2,559 double centner, value 2,659,000 Reichsmark) (Double centner)	12,465	8,547
Value (Reichsmark)	11,582,000	9,349,000
To Great Britain (Double centner) ...	739	359
,, Austria (Double centner)	971	518
,, Czecho-Slovakia (Double centner)...	920	729
,, Russia (Double centner)	1,051	1,221
,, Spain (Double centner)	952	718
,, Argentina (Double centner)	994	393

The National Register of Electrical Installation Contractors.

Report and Annual Meeting.

The report for the past year of the Executive Committee of the National Register of Electrical Installation Contractors commenced with an expression of regret at the death of Mr. L. G. Tate, whose efforts in its initiation and active assistance in furthering its aims and objects, had placed the institution under a deep obligation. The executive was advised that the Articles of Association would have to be amended, to enable registered contractors who were not members of any electrical trade organisation to appoint representatives on the Registration Board. The income and expenditure account did not show receipts in the same proportion as the previous year, as the fee for renewal was £1 only, whereas that for registration was £5, and new applications accepted totalled 163 as compared with 674, including duplicates for 1924. Assuming that the expenditure was on no greater scale than the year 1925, and that advertising and publicity expenditure were treated as special items, the annual expenditure was estimated to amount to approximately £1,000, leaving a deficit of approximately £100 to be made up by further registrations, which it was anticipated would be forthcoming during 1926.

Applications for registration up to December 31st, 1925, totalled 930, of which 804 were accepted and 50 were still under investigation and consideration; of the remainder 76 were declined for various reasons. Bringing these figures up to the date of the last meeting of the Executive, 1,018 applications had been received, 853 accepted and 84 declined, so that for the comparable year there was a net addition of 183 contractors to the Register. During the year there were 11 registrations which were not renewed owing to various causes. The Executive recommended the amendment of the rules to provide that branch establishments of a registered contractor might be registered for the payment of £1 and £1 annual renewal fee. The municipalities of Cheltenham and West Hartlepool, and the Newcastle-upon-Tyne Electric Supply Co., had joined the corporate bodies which were confining their orders to tenderers who were on the National Register. Inquiries which had been made encouraged the Executive to believe that Corporations were making considerable use of the National Register. Consultants and architects had also applied for information. During the year a Publicity Committee was appointed on which Mr. Beauchamp and the late Mr. Tate were co-opted to take up the question and to carry out a programme, and a complete list in book form of registered contractors was issued to station engineers, consultants, architects and builders to the number of some 15,000. The Royal Institute of British Architects, in pursuance of a settled policy, was withdrawing its representatives from all institutions including the Registration Board. An agreement was reached with the Commissioners of Inland Revenue that the renewal fees paid by Registered Contractors should be allowed as a trading expenditure in their accounts.

Eighty local Advisory Committees had now been constituted and were functioning smoothly. The following nominations to the Board were made by the respective nominating bodies: The Institution of Electrical Engineers, the Incorporated Municipal Electrical Association, the British Electrical and Allied Manufacturers' Association, the Association of Consulting Engineers, and the Illuminating Engineering Society, renominated their respective retiring representatives. The Electrical Contractors' Association of Scotland nominated Mr. R. A. Ure in the place of Mr. A. Lindsay. The Electrical Contractors' Association, the Electrical Wholesalers' Federation, the Irish Centre of the Institution of Electrical Engineers, and the Electricity Supply Association of Ireland, had not sent in their nominations up to the date of the report. Many inquiries had been made as to whether the National Register had adopted a set of wiring rules. Such was not the case, but it was probable that the subject would have to be considered by the Board in the future. A lengthy inquiry was made by the Executive into complaints against the work of a registered contractor carrying on business in a northern suburb of London, which were found to be justified and admitted by the contractor. The Committee had no other course open but to withdraw his certificate and strike his name off the Register. Notices of appeal from the Executive's refusal to register two applicants were received and an appeal was lodged against the Executive's refusal to approve a new qualifying manager of a registered contractor. The Executive invited discussion and such a decision on the subject as would lead to the most economical and speedy procedure being adopted.

The report concluded with special reference to the indefatigable services of the chairman, Mr. P. V. Hunter.

The annual meeting of the Registration Board was held at the Institution of Electrical Engineers on March 22nd, under the chairmanship of Mr. P. V. Hunter. After the adoption of the balance sheet and accounts, Mr. Shaw raised the question of the various Local Advisory Committees holding meetings in their areas for the purpose of obtaining further applications for registration, and a general discussion ensued. It was pointed out that the National Register considered that it could not canvass for applicants, but was prepared to grant registration to duly qualified applicants, and that the matter of increasing the number of registered contractors lay with the contractors themselves. The matter was left to the Executive Committee for further consideration and to make any recommendations which it might think fit to the contractors' associations concerned.

The nomination of Mr. Ure as the representative of the Electrical Contractors' Association of Scotland in the place of Mr. Alex. Lindsay was confirmed, and the retiring representatives of other bodies having been renominated were re-appointed. The retiring members of the Executive Committee, Messrs. Dykes, Cash, and Britton, were also re-appointed.

A lengthy discussion on the subject of the adoption of a set of wiring rules by the National Register was then entered into, in which Col. Crompton, Mr. Dykes, Mr. Shaw, Mr. Cash, and Mr. Gaster took part, and the difficulties in the way of so doing were fully pointed out. The general opinion was that the time was not yet opportune to take action in that direction, and the matter was left in the hands of the Executive to report to the Registration Board when action should appear desirable.

The Chairman explained the desirability of amending the rules affecting the registration of branch establishments and moved amendments, which were adopted. The chairman and the vice-chairman were unanimously re-appointed for the ensuing year. The question of hearing appeals from decisions of the Executive was discussed, and it was decided that a month's notice to members of the Registration Board other than those on the Executive Committee would be sufficient to secure the necessary number on the day fixed. A vote of thanks to the chairman concluded the proceedings of the meeting.

International Fair at Salonica.—*Reuter's Trade Service* learns that one of the principal aims of the International Fair to be held at Salonica from May 15th to May 31st is to give the trade and agricultural centres of Greece, particularly those of Macedonia, an opportunity of entering into closer and more frequent business relations with European manufacturers. The articles to be exhibited at the Fair include electrical apparatus, dynamos, motors, transformers, lighting and heating equipment, &c. Further particulars and application forms can be obtained from any Greek Consulate in Great Britain or the Fair's hon. representative in England, Mr. G. Loutsis, Commercial Secretary, 51, Upper Brook Street, W.1.

Municipal Electrical Service.

The Colwyn Bay and Doncaster Bills and Local Contractors.

(*Concluded from page 519*).

The Colwyn Bay Case—(*continued*).

Mr. F. C. RAPHAEL (consulting engineer) gave evidence on behalf of the contractors. Originally, he said, a number of undertakers had obtained full selling powers, but in 1904 the Electrical Contractors' Association was formed and had opposed a number of Bills, with the result that time after time special conditions were inserted to the effect that the powers granted could only be exercised through a contractor. The Electricity (Supply) Act, 1919, did not give those powers to local authorities, whilst in a later contest the Wakefield Corporation had been refused these powers by the House of Lords. Side by side with the Parliamentary fight there had been an action in the Law Courts, when the Leicester and Sheffield Corporations lost their cases. He also quoted from the Annual Report of the Electricity Commissioners published in 1923, where it was stated that in granting Special Orders it was the general policy of the Commmissioners not to confer any powers with regard to electrical fittings beyond those conferred on joint electricity and local authority undertakers by Section 23 of the Act of 1919, and that any departure from that policy could only be considered in cases where strong and exceptional reasons were given. Witness could not recollect any cases which had been fought since 1904 in which full powers had been given, except that of the London County Council General Powers Act, until last year, when selling powers were given to the Bath, Burnley and Barrow Corporations. In those cases the main reason put forward was that it was desired to wire poorer class houses on a free-wiring or hire-purchase system, and he was strongly in favour of that. It was not necessary, however, in order to carry out that scheme, that the local authority should do the wiring. He saw no object in local authorities starting wiring departments, which was a new business entirely. They had already contracting firms who could carry out the work and naturally they had to invest their capital for those installations if they were going to sell them on the hire-purchase system. The amount of capital that they invested would be no more if they employed a contractor to do the work than if they did it themselves; in fact, it might conceivably be very much less because they had to build up their wiring business first. By having contractors in the district they had the advantage of the canvassing done by the contractors and further, there was always better canvassing where there was competition than in the case of a monopoly. Reference was then made to cases where wiring was carried out on hire-purchase terms through contractors, though the local authorities concerned did not possess or had not put into force wiring powers. In the case of South Shields the contractors' canvassers were provided with a form of hiring agreement, they were paid on commission by the contractors, and the contractors who secured the orders were given the order for the wiring, which was carried out on an agreed schedule and financed by the Corporation. Within six months of the inception of that scheme there were 7,477 applications for supply. Within seven months the number of private houses connected to the supply had increased by 86 per cent. Mr. Raphael said that all the wiring was carried out in comparatively small property. There was nothing to prevent the Colwyn Bay Council from carrying out a similar scheme if it chose to do so without further powers. The St. Marylebone Borough Council, though it had full powers, did not use them, but had an assisted wiring scheme. Applications for wiring were submitted to contractors for tender, the most suitable being accepted. In the 18 months from the time the scheme was started until November last, 177 radiators and 128 cookers had been connected in one block of artisan dwellings only, containing 540 flats, and the total energy consumed was estimated to be 238,894 kWh. At Walthamstow, where full wiring powers were possessed, the local authority had had an assisted scheme since 1922 It did not have a fixed rate for rentals, but obtained quotations for the work from contractors and worked out the rentals from those. The consumers chose their lamps and shades at the local authority's showroom and bought them from the contractors. Other hire-purchase schemes referred to, in which the work was done by the contractors, were those of Tamworth and Gillingham, Kent.

The CHAIRMAN asked whether it did not come to this, that so long as the contractors were reasonable the corporations would employ them to do the work, whether they had powers or not. Mr RAPHAEL replied that that would be the reasonable course, but there were cases where there were very pushful municipal engineers who would exercise their powers and drive the contractors out of business. The CHAIRMAN asked if there were no contractors who were unreasonable.

In further evidence, the witness said there was no guarantee that a wiring department run by a local authority would be self-supporting. He had examined the accounts of a number of undertakings who had these powers and it was impossible to ascertain whether the wiring departments were carried on at a loss or at a profit. He also stated that as a rule local authorities had no experience of wiring, whereas on the whole the contractor knew his business very well and did it very well. If the Colwyn Bay Council started wiring it would be in the position, as the supply authority, to condemn the wiring carried out by contractors; also the consumer who received tenders for wiring from the Council as well as from contractors would, in nine cases out of ten, accept the Council's tender on the pure question of standing. As to the allegations of bad wiring at Colwyn Bay, he gathered from the evidence that with the exception of one or two cases, they were matters of very small detail. Cross-examining, Mr. ROWAND HARKER said that witness suggested that the scheme was one by which the Council should be liable to the contractor for the full amount of the bill and that the ratepayers should finance the local contractors who were unable to finance themselves. Witness agreed that the Council should pay for the wiring; it would finance not the contractors but the hire-purchase scheme. Mr. HARKER said that if the hire-purchaser did not meet his obligations the ratepayers would bear the loss incurred. Witness replied that there should be no loss because the Corporation could collect the fittings. He agreed that the wiring would be of little value unless taken over by the next tenant, but there had been very few failures in that respect. Mr. HARKER asked if it were suggested that if the Council obtained these powers it would deliberately run the wiring department at a loss in order to drive the independent contractors out of business. WITNESS replied the Council would not do it for that purpose but any municipal department which started a business and could not run it at a profit would continue to run it at a loss. Mr. HARKER pointed out that the clause in the present Bill made it clear that work carried out under the powers asked for should be self-supporting, whilst another clause imposed upon the Council the obligation to keep separate accounts for each undertaking and laid down exactly how moneys were to be applied.

Referring to the report of the Electricity Commissioners, Counsel asked whether it was not the case that the Commissioners took the view that when simply asked to "extend" existing powers they had no jurisdiction to grant such powers as the Council was now asking for. WITNESS replied that the Commissioners' view was that they had no jurisdiction to grant any powers at all beyond those referred to in Section 23 of the 1919 Act.

Mr. T. E. ALGER (President of the E.C.A.) was the final witness, and was giving evidence as to why competition by local authorities was ruinous to contractors, when Mr. TURNER (representing the Colwyn Bay Council) interposed with the remark that the Association was not petitioning in this case but that the petitioners were individual contractors in Colwyn Bay. In his cross-examination, Mr. TURNER, having ascertained that there were eight members of the Association in Colwyn Bay, suggested that they had joined in large numbers recently in view of the present proceedings. Witness, however, disagreed and said he did not think any had joined within the last six months, although he was not sure about that. Those eight members would represent 90 per cent. of the competent electrical contractors in Colwyn Bay and they were admitted to membership by examination.

This concluded the evidence, it being stated by Mr. Drucquer that he had other witnesses, but as their evidence did not refer specially to Colwyn Bay he would not call them, in view of the Chairman's request that the evidence should deal as far as possible with the conditions there.

Mr. DRUCQUER, addressing the Committee on behalf of the contractors, said he fully realised the difficulty which he had to face in that last year a Committee of the House of Lords, after carefully considering the matter, had decided to grant the powers now asked for to the Bath, Burnley and Barrow Corporations. He asked the Committee, however, to deal with the matter now upon the special grounds relating to Colwyn Bay. There was no doubt at all that in the case of the three Bills referred to the matter was, to a very great extent, decided upon principle. He did not dispute that, prior to 1904 when the E.C.A. was formed, some 71 local authorities had obtained the powers now asked for, because nobody had opposed or had thought about them, but from 1904 to 1919 the Association had opposed successfully in all cases except that of the L.C.C. General Powers Act, and had succeeded in getting the powers refused or a special clause inserted which provided that the work should be done through contractors. There could be no doubt, therefore, that the policy of Parliament, and especially of the House of Lords, was that it was inimical to the interests of the country that this retail trade should be carried on by local authorities against the contractors. That policy was also reflected in general Acts of Parliament. In the Electric Lighting (Clauses) Act, 1909, an attempt was made to insert those powers, but it was unsuccessful; the Electricity (Supply) Act of 1919 did not give the powers, but made it necessary for a local authority to show a special case before they could be granted. The powers were also refused in other private Bills. Dealing with the events leading up to the granting of these powers in the Bath, Burnley, and Barrow Bills last year, he said that the Institution of Municipal Engineers had written to the Lord Chairman pointing out for the first time, so far as counsel was aware, that there was a very strong case for giving those powers, because, unless they were granted, it would be impossible to

supply electricity to a very large number of the poorer classes, who could not afford to pay the initial cost of wiring. In consequence of that, a Committee was appointed specially to inquire into it. The evidence before that Committee was such that he could scarcely see how it could have reached any other decision than to grant the powers, because it had had simply a strong body of evidence to the effect that the powers were necessary in order to wire working-class houses. Had that Special Committee known that free-wiring or hire-purchase wiring could be done and was being done very successfully by a number of local authorities throughout the country, whether or not they had those powers, that change of mind of which Lord Strachie had spoken would not have occurred.

Continuing his address on March 19th, Mr. Drucquer referred to the case made by the Council that it was absurd for it to go to the expense of providing a showroom and not be allowed to sell fittings in it. His answer to that was that the cost would be very small, as the fittings shown would be supplied by manufacturers or contractors who would be pleased to supply them. It would be dangerous for a local authority supply undertaking to carry on selling, and in Manchester it was appreciated that it was not safe to run a separate trading undertaking owing to the danger of being unable to cover properly the risk of loss, but a showroom was maintained. As to the suggestion that it was unreasonable to expect the local authority to pay for wiring and fittings supplied on the hire-purchase system and for the contractors to take the profit, he pointed out that the local authority would have to pay whether it carried out the wiring itself or through the electrical contractors, and it would then receive payment by instalments. On the other hand, by doing the work through contractors, it had a body of men who, by reason of competition among themselves, were certain to do their best to obtain new consumers.

Another ground on which it was urged that the powers should be granted was that it was fairer when consumers who had hired cookers and other big appliances wished to buy them, that the Council should have power to sell. In this case, however, the Council had never made any attempt to let these appliances; it had not let a single cooker. Even so, the main point about letting cookers was that it increased the consumption of electricity. It had also been suggested that when cookers were no longer required, the Council could do nothing but scrap them. There was no evidence, however, that that was so; such cookers could be burnished up and hired out again. The allegation as to bad workmanship in Colwyn Bay was a very slender reason indeed for putting forward the present case. There were cases of bad workmanship all over the country, and there was no special reason for saying that the contractors of Colwyn Bay as a body were not fit to carry out the work. If there was ever a case which showed an absence of all enterprise, it was this particular case. In the witnesses' own admission the undertaking was in a very serious state. Its supply was equivalent to 33 kWh per head of population, and it was due to the lack of initiative. Blackpool had been referred to as a successful undertaking, but Blackpool had not the powers now asked for, and was comparable in every respect with Colwyn Bay, except that in the one case there was real initiative, whilst in the other there was none. A retail trade of the description referred to needed initiative, and if the Council had not that initiative that was one of the principal reasons why the powers should not be granted in this case. The Council had done nothing to increase the number of consumers, except in the case of new houses, and the supply in those cases was probably given as the result of applications by the householders themselves. Finally, having regard to the fact that the Lord Chairman hoped that a Joint Committee would be appointed at an early date to settle once and for all by statutory enactment what should be the powers granted to local authorities, he asked that the powers should not be granted until that Special Committee had been appointed.

The Chairman said that the Committee was unanimously of opinion that it was not necessary for counsel for the promoters to address the Committee, the decision being in favour of the granting of the powers.

The Doncaster Corporation Bill.

A Select Committee of the House of Commons considered Clauses 43 and 44 of the Doncaster Corporation Bill on March 22nd and subsequent days. These clauses asked for full wiring and hiring and selling powers in respect of electrical fittings, and powers to maintain showrooms. The proceedings were largely a repetition of those before the House of Lords Committee which considered the Colwyn Bay Bill. The same Counsel appeared as in the Colwyn Bay Bill, *viz.*, Mr. Tyldesley Jones, K.C., Mr. Harker, K.C., and Mr. Wrottesley, K.C., for the Doncaster Corporation, and Mr. Craig Henderson, K.C., and Mr. Drucquers for the electrical contractors, who again opposed.

Mr. Tyldesley Jones, in the course of his address on behalf of the Corporation, said that the principle that local authorities should supply electricity had been established and it was only logical that these authorities should be able to wire premises and hire and sell apparatus in the same way that electricity supply companies and gas companies could. As a matter of fact, the Doncaster Corporation owned the gas undertaking in the town and had all these powers in respect of gas. The development of electricity supply would be greatly speeded up if the Corporation had the powers; there were difficulties in the way of contractors wiring houses on the hire-purchase system or letting out apparatus on hire. The clause provided that the wiring business should not be carried on at a loss. Referring to the report of Lord Weir's Committee, Counsel called attention to the statement that the restriction on municipalities with regard to the supply of electrical fittings, &c., did not exist in America and ought to be removed in this country. It was true that no clause to this effect appeared in the Government Bill, but the Committee had made a very clear statement of its view on the matter. The Electricity Commissioners had drawn attention to the powers granted under Section 23 of the Electricity Supply Act, 1919, which permitted local authorities to hire out fittings but not to sell them, and had stated that no doubt the Committee would require the Corporation to justify the wider powers now being asked for. Counsel urged that full powers should be granted to municipalities unless very good reasons could be brought to the contrary.

Mr. S. R. Windle, borough electrical engineer, Doncaster, said that there were 12,000 premises in the borough, of which only 4,000 were connected to the electricity supply mains. The reason was that the tenants of smaller houses could not afford the expenditure involved in wiring their houses and the landlords would not do it. He was constantly finding people who had electricity for lighting and wanted apparatus such as cookers, vacuum cleaners, &c., but the cost of these was too high unless they were hired or let out on a hire-purchase system. At present the cost of wiring for lighting purposes in Doncaster was from 20s. to 25s. per point and considerably more than that for power purposes. He would be willing to co-operate with contractors to develop the supply in the borough but he could not say what the policy of his Committee would be in that respect. He would not agree that the contractors would be badly hit if the Corporation came in as a competitor, because under the scheme of development contemplated, new consumers would be obtained who would never come on to the mains under the present system. Broadly, the desire of the Corporation was to be able to deal with the customer right through into his premises and to give real service in connection with electricity supply.

On March 23rd, Mr. Windle, in answer to questions by Mr. Craig Henderson, for the electrical contractors, denied that the Corporation had been slack in developing the electricity supply undertaking. The Corporation had not put the powers to hire, under the Electricity Supply Act of 1919, into force because those powers were not considered sufficiently comprehensive. Moreover, it was not considered practicable to hire out electric cookers without giving the customer an option to buy. He regarded easy payment terms of purchase as a very important factor. He agreed that the Corporation had never tried to hire out cookers nor had it prepared a tariff of charges for hiring.

Mr. H. M. Marshall, a member of the Electricity and Housing Committees, said that 52,000 people in Doncaster out of a total of 55,000, were living in houses having a rental of less than 10s. per week and it was in order to deal with those that the wiring and fittings clauses were asked for. In the ordinary way, assuming the contractors offered a reasonable schedule of prices, the work would be done through contractors and not direct, but without the power on the part of the Corporation to do the work direct it would be in the hands of the contractors. There had been an instance of that in connection with a housing scheme when four contractors quoted exactly the same price, *viz.*, £612 for wiring 42 houses. The Corporation and the Government Housing Inspector thought the price too high and the work was not carried out.

Mr. Henderson expressed strong doubts whether the tenants of such small property as had been referred to, would really improve the landlords' property, by wiring it at their own expense.

Mr. Matthews said that the position of the contractors in the event of the powers being granted, had been seriously discussed by the Electricity Committee and everything possible would be done to co-operate with them and prevent any injury to them, if the contractors would assist.

Mr. F. W. Purse (borough electrical engineer, West Ham) said that West Ham had had full wiring powers since 1898 and did most of the work directly, although there was a certain amount done by contractors. He agreed that the number of contractors in the borough was now very small and that there was not one registered contractor there. He did not think the Doncaster contractors would be injured by the present proposals, so far as sales of fittings were concerned. The Corporation would be handicapped if it could not sell fittings in the showrooms.

Asked about the South Shields wiring scheme, which was being carried on through contractors, Mr. Purse replied that although the scheme had been a success, it was not one which he would recommend his Committee to adopt. It was nothing more than a disguised hire-purchase system, carried out through contractors, and if anyone cared to take action it seemed to him that an injunction could be obtained against the Corporation. Asked as to his own wiring and fittings department, Mr. Purse replied that a balance had been shown on the right side ever since it was started, allowance being made for interest on capital and depreciation. This closed the case for the promoters with regard to the wiring clauses.

The first witness for the contractors in opposition to the clauses was Mr. Walter Finlay, secretary of the Electrical Contractors' Association of Scotland, who emphasised the point that the Edinburgh Corporation had no powers to sell fittings and did all its wiring and fitting through contractors, whilst the Glasgow Corporation, which had powers to sell as

well as to hire, also did all its work through contractors in a most satisfactory manner. As to the demand for the hire-purchase of electric cookers, he said the sensible man would hire in order to safeguard himself against obsolescence. He objected to the Doncaster Corporation having selling powers because the customers might get the impression that their work would be better and more expeditiously done by the Corporation than by contractors, whereas it was not so.

Mr. FINLAY said he had no doubt that the clause was all right in theory from the paying point of view, but in practice it did not always work out, and Corporations did not always conform to the strict letter of the clause. If no one took action then a loss might very well be incurred; it had happened in Scotland.

On the question of wiring small houses, Mr. Finlay said that once the Rent Restriction Act was done away with, he believed landlords would be inclined to have their houses wired, even when they were quite small, but he admitted that the Scottish wiring contractors had not advertised offering to undertake wiring on the hire-purchase system, although he believed that it had been done by private arrangement. Replying to questions concerning the necessity to inform the supply authority of a possible customer, Mr. Finlay said it was necessary to find out where the cut-out would be and it would be impossible to avoid giving away the name of the customer to the Department, and that was undesirable when the Department was also a competitor.

Mr. THOMAS ALGER (President of the Electrical Contractors' Association) said that that Association had a membership of 1,250, representing 90 per cent. of the firms in the trade. It was impossible for contractors to exist in a district where the Corporation had the powers asked for and did the work itself. At West Ham, for instance, there were no electrical contractors of any importance. A short time ago, the Hackney Council followed the policy of West Ham and there were no electrical contractors in the borough but since that policy had been changed, there were good class contractors there, and they were now doing the work for the Borough Council. Something like 20 or 30 contractors could get a living in West Ham if it were not for the policy of the Corporation. Questioned as to the position of contractors concerning hire-purchase arrangements, Mr. ALGER said this matter was under the serious consideration of the contractors in conjunction with the manufacturers and he hoped that something would be done before long. If, however, full wiring powers were to be given to local authorities, the effect would ultimately be the same as had happened in the gas industry. Owing to the work being done by the gas supply authorities there was hardly an ordinary gas fitter left in business in the country. The contractors and the manufacturers in an endeavour to work out a hire-purchase scheme for wiring and fittings, had seriously discussed the matter during the past twelve months.

Mr. E. BRETT, a Doncaster electrical contractor, and one of the contractors who put in the price of £612 referred to earlier in the proceedings, said he had had no communication whatever with the other three firms who quoted precisely the same price, and it came as a surprise to him to know that they were identical. It rather emphasised the keenness of the competition among the contractors of Doncaster. The Corporation went outside the borough for a later contract and gave it to a man who so undercut that he went bankrupt before he could complete the contract. Witness had not advertised his willingness to undertake wiring on the hire-purchase system, but he had done work and allowed payment to stand over for a while.

Mr. G. E. SHIPE, another Doncaster electrical contractor, was also called and the Committee adjourned until March 24th, when counsel delivered their final speeches.

Mr. CRAIG HENDERSON, K.C., for the contractors, referred to a number of local authorities, with and without selling powers, which were carrying on business successfully by co-operation with contractors. He contended that Section 23 of the Electricity Supply Act of 1919 did not give wiring powers to local authorities which had not been authorised under a special Act or Order. He appealed to the Committee to leave the general law on the subject as it was at present, pending a general discussion of the whole subject, which would settle the difficulty once for all. Perhaps the best way to do that would be for the municipal authorities to seek to insert a similar clause to Clause 43 of the Doncaster Bill, in the Government's Electricity Supply Bill when it was discussed in the House of Commons, and so get a final decision which would become the general legislation for the country. In conclusion, he said that it the Corporation was merely asking for powers to deal with wiring under hire-purchase arrangements, the work of installation to be done by contractors, the contractors would not have opposed.

Mr. ROWAND HARKER, on behalf of the Corporation, said that it was the intention, if the Committee allowed Clauses 23 and 44 to work through contractors if the contractors made it possible by offering reasonable schedules of prices.

The CHAIRMAN inquired whether the Doncaster Corporation Gas Department had powers to sell gas fittings, and was informed that those powers existed but were not exercised.

The CHAIRMAN, in announcing the Committee's decision, said that Clauses 43 and 44 would be granted subject to the insertion of a provision that the wiring of premises must be carried out only through contractors.

A Survey of Industrial Relations.

Wages and Conditions.

THIS is the title of the second report* by the Committee on Industry and Trade, under the chairmanship of Sir Arthur Balfour, K.B.E.† In an introductory summary and review the Committee has digested a vast amount of authoritative information relating to wages, hours, and conditions in industry. The Committee emphasises the fact that the volume is purely descriptive and it does not make definite recommendations for action.

Having explained that the proportion of the population which follows definite occupations has remained fairly constant during the last forty years, the Committee draws attention to the decrease between 1881 and 1921 in the numbers and percentage employed in agriculture, *viz.*, from 1,500,000 (12 per cent.) to 1,300,000 (7 per cent.) and the great increases in coal mining, from 500,000 (4 per cent.) to 1,300,000 (7 per cent.); and in the metal and engineering group of trades, from 900,000 (7 per cent.) to nearly 2,500,000 (13 per cent.).

The Committee then proceeds to discuss the subject of wages. Having mentioned that the Board of Trade Index Number of wages showed a rise of about 13 or 14 per cent. in the twenty years preceding the war, it examines the level of rates of money wages in 1924 and 1925 as compared with 1914 and states that on the whole this rise may be taken to average between 70 and 75 per cent. over industry as a whole. The conclusion is reached that the prevailing rates of increase of weekly rates of money wages in the most exposed trades range from 45 to 75 per cent., with an average of about 60, while for the trades sometimes described as "sheltered" the increases range from 80 to 120 per cent., with an average of about 100. The average "real" rates of wages have remained roughly unchanged. The Committee further finds that in industries in which time rates of wages prevail, skilled workers fully employed in industries directly exposed to foreign competition are on the average less well off than before the war, while, on the other hand, unskilled workers generally, and workers in the so-called "sheltered" industries, have, generally speaking, improved their position. The Committee points out that in any trades in which piece-work has become materially more prevalent since 1914, the true average rise in weekly earnings will be somewhat greater than the recorded rise in time rates. On the question of wages in other countries, the Committee emphasises the difficulties surrounding the subject but quotes such official figures as are available for comparing the purchasing power of wages in London and various other capital cities. With certain qualifications, it may be said that the figures for June, 1924, indicate that in New York and Ottawa the purchasing power of an hour's wages in terms of food was roughly double that in London, while at the other end of the scale were Rome and Vienna with purchasing power less than half that of London. The figures for Paris and Berlin were each about two-thirds, and that for Brussels about three-fifths, of the London figure.

The Committee says that there are indications that payment by results has probably been gaining somewhat on payment by time, and describes certain special methods of industrial remuneration such as profit-sharing and family allowances, in certain foreign countries.

The Committee estimates that in 1914 the average weekly hours of industry were between 53 and 54 and that they have been reduced now to an average of about 48. In pre-war years, while wage movements were subject to periodic fluctuations, there was a continuous tendency towards the shortening of the working day. There has been little general change since 1914 in the ratio between overtime and ordinary rates of pay, or in the overtime conditions generally prevailing. The movement towards reduced hours of labour in Great Britain is only part of the movement in the same direction throughout a great part of the world, and mention is made of the legislation enacted in a large number of countries for the establishment of maximum hours of labour, usually, in principle, eight a day, or 48 a week. It is pointed out that this legislation differs very materially and is very elastic.

Passing from questions of remuneration and hours of labour, the Committee proceeds to discuss a group of miscellaneous matters concerning working conditions. The question of industrial fatigue is dealt with and the Committee points out that in given industries an optimum limit of hours in relation to production per hour and per shift can probably be determined. The Committee expresses the view that the researches on this and cognate points by the Industrial Fatigue Research Board may be expected to have important bearings on indus-

* The first report was published in July last (ELEC. REV., July 24th, p. 151), and took the form of a survey of overseas markets.

† Stationery Office, 5s. net.

trial efficiency, and refers to the improvements in the amenities of workshop life and in industrial relations, and the increased continuity of personnel and productive efficiency which have already taken place and may be expected to result in increasing measure from the development of welfare work through the voluntary action of employers and the encouragement of Joint Industrial Councils and the Industrial Welfare Society. Mention is made of the increasing attention which welfare activity is receiving in the other principal industrial countries. On the subject of time lost in industry through various causes, the Committee points out that time lost through sickness in the three years 1921-4 was very much less than that lost through unemployment, while the time lost through the latter cause was also many times greater than that lost by persons engaged in trade disputes. Attention is also drawn to the loss of time in certain important industries, *e.g.*, the engineering, shipbuilding and building trades due to disputes between different bodies of skilled workmen as to their right to perform a particular branch of work. During the four years 1921 to 1924, an average of 74 million man weeks of potential work were lost owing to unemployment alone, the figure in the worst year, 1921, being as high as 93 million. It is found that unemployment has been higher in the group of exporting trades than in industry in general. The main groups of industries which have lately been most severely depressed are those connected with or dependent upon shipping or iron and steel. The readjustment of personnel and plant to peace requirements is still incomplete in some of these industries. On the other hand, most trades connected with house construction showed rates of unemployment well below the average, and the same is true of the printing and paper trades, public utility services (gas, water and electricity supply, railway, tram and omnibus services, &c.), and the distributive trades. The total number of persons in employment in Great Britain is fully as great as immediately before the war, the increased margin of unemployed being at least balanced by the increase of the employed population. An investigation made by the Ministry of Labour showed, *inter alia*, that 63 per cent. of the males and 77 per cent. of the females in the sample 10,000 individuals examined would in normal times usually be in steady employment. As to unemployment in other countries, two tendencies appear to be indicated, *viz.*, that in the period immediately before the war the percentage of industrial workers totally unemployed in Germany was probably lower and the range of its variation narrower than in Great Britain, and that while a collapse of employment occurred in the United States in 1920-21, at the same time as that in Great Britain, the recovery was much more rapid in that country than here.

The Committee includes its review with a discussion of the machinery in existence for industrial negotiation. It draws attention to the growth of collective bargaining, the result of which is a widespread system of regulating working conditions by means of national agreements reached by the parties themselves. The two main tendencies to which the committee calls attention are the essentially voluntary nature of British practice, and the differences which exist in the machinery evolved in the various trades to correspond to the great variety of conditions and needs of the individual industries themselves. The Committee considers that probably far fewer disputes to-day arise out of mere misunderstanding than was the case prior to the war. The Committee gives a summary of the legislation in existence in the Dominions and in foreign countries for the prevention and settlement of industrial disputes. It is explained that while many countries have relied on purely voluntary methods, a number of experiments in the utilisation of compulsion in one form or another have been made. The Committee selects the experiences of Australia, New Zealand and Canada as the most instructive, and explains the systems of compulsory awards, prohibition of strikes and compulsory investigation of disputes in existence in each of these Dominions. The experiences of Australia and New Zealand suggest that where compulsion is present conciliation in the true sense will be neglected.

High-Power Fusible Cut-Outs.

Some Factors which Influence their Rupturing Capacity, and Research Developments.

By L. C. GRANT, A.M.I.E.E.

(*Abstract of Paper read before the* Institution of Electrical Engineers.)

Hitherto fuses have been used to control only small amounts of power; in this section of the subject no real problem is involved, but when the power source is large the simple fuse in its various arrangements becomes unequal to the duty. Power station auxiliaries are usually supplied from a transformer bank of the order of 2,000 kVA, which could feed perhaps 50,000 kVA into a fault. This immediately emphasises an important difference between the duty required of a fuse and a circuit breaker, for a properly designed fuse operates so rapidly that the peak current and the effect of asymmetry must be taken into account in estimating the kVA to be ruptured. Distribution network transformers are usually fed from a high-pressure system of considerable capacity which would thus be capable of maintaining the full potential on the primary of the transformer under almost any condition. The use of pressures, nor was there a reliable fuse suitable for the protection of potential transformers and similar duty. A heavy-current medium-voltage fuse is one important requirement for switchboard and similar work, and a good high-pressure fuse is equally desirable. Even at the present time there are few fuses which could clear a short-circuit properly, yet this is an essential duty if safe and consistent design is to be a characteristic of any scheme. Many of the claims made for fusible cut-outs could not be substantiated, and the general impression obtained from the tests was that most manufacturers were not correctly visualising the problem.

The author has endeavoured to confine his attention to the rupturing capacity and the problems having a direct bearing upon it. Between the time a new fuse element is fitted and the time it may operate, the setting is gradually altering.

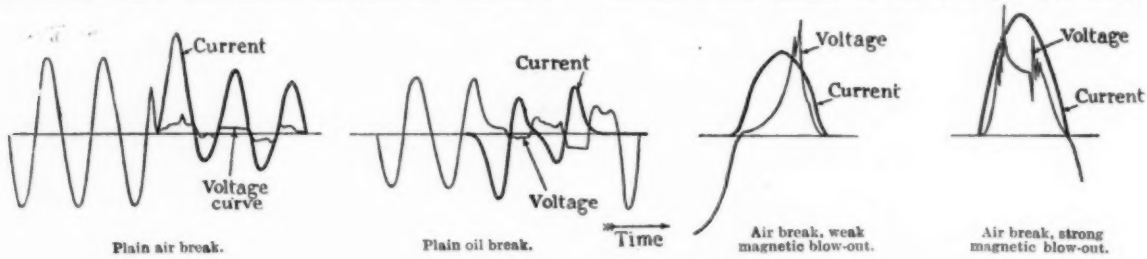


Fig. 1.—Comparison of Arc Characteristics.

circuit breakers would entail considerable expenditure, and if good fuses can be used in their stead it is an unquestionable economy to do so.

A point in favour of the fuse in preference to a circuit breaker is that more consistent protection can thus be obtained. Many distributors, installations, and apparatus are controlled by fuses, and the characteristics of the plant connected are essentially thermal. Therefore, any main circuit-breaking device should preferably have a characteristic time-current curve similar to that of a fuse. The author has not found for this duty any suitable device, other than a fusible cut-out, which consistently reproduces a thermal time-current curve.

Attention was at first concentrated on finding the limitations of and, if possible, devising improvements in existing designs. Afterwards, changes in design were made with a view to eliminating the known troubles At the time this work was commenced, the author could not find any fuse capable of rupturing, with reliability, large currents at moderate or high The time-current curve is therefore difficult to control and almost impossible to maintain with consistency. Deterioration also takes place through mechanical vibration, through innumerable changes in temperature due to load variations, air draughts and other causes, and through electrically induced vibration. The simple fuse will rupture large powers, but that is not the only problem; it must clear the fault without a dangerous explosion and without arcing over to neighbouring parts. Failure under these tests has proved the impossibility of producing a good cut-out of this class. In practice it has been found necessary to limit the continuous full-load current to between one-third and one-half of the minimum fusing current, otherwise cumulative oxidation will be set up. When the oxide film breaks down at a temperature near to the fusing temperature of the metal, as with copper, the process of rupturing is not affected to any marked extent by the presence of the oxide; but with such metals as tin, aluminium and zinc, the oxides are capable of holding up the molten metal after the current has raised the fusible element to its

melting point. With open elements of small size the oxide skin not only increases the rated minimum fusing current, but exerts upon the fusible element a variable effect which cannot be predetermined.

The section of the fusible element plays a part in limiting the current on short-circuit, but the effect is due not so much to the resistance of the element as to the point in the growth of the short-circuit current at which the element melts. In other words, it is possible to prevent the current rising to its full short-circuit value by using a rapidly-acting fusible element. For this, as well as other reasons, it is important to reduce the amount of metal in the element to a minimum, but the limit is set by the risk of introducing oxidation. On a 6,000-volt system with a maximum short-circuit power of 70,000 kVA a 100-ampere fuse of careless construction will pass practically the full short-circuit power before it clears, but if the ratio of fusing current to load current is reduced to the lowest practicable value of 1.2:1, a limiting effect will be exerted and the short-circuit power to be ruptured will be of the order of 6,000 kVA.

It is possible to reduce the ratio on a simple fuse to some extent by extreme care in the design of the carrier, by paying attention to cooling and so on; but for best results it appears to be necessary to make radical departures in the design of the fusible element. The functions of melting and heating are separated in one type of fusible cut-out commercially available, and heat is transmitted from a calibrated copper " neck " to a tin and copper fusible element. The tin runs at a lower temperature than the restricted portion of the element and heat is transmitted from the restricted portion in proportion to the load carried by it. When the load reaches a value which causes sufficient heat to be transmitted to the tin portion to melt it, the circuit is broken. With this arrangement it is possible to get a fusing-current/load-current ratio of 1.2 to 1.

At the moment of rupture the metallic fusible element becomes a conducting vapour path. It is important to reduce the temperature rapidly in order to reduce the arc energy to the lowest possible value. In cartridges the filling cools and condenses the metallic vapour, and a sub-divided or multiple element, or the equivalent, gives the dual advantage of a greater surface area in contact with the filler, whilst the increased radiation surface enables a smaller aggregate section to be used for a given current.

A proper magnetic arc blow-out at the point of rupture decreases the arcing time, but, if misapplied, may produce voltage harmonics often of a dangerous amplitude; incorrect form may introduce complex phenomena, resulting in a greater amount of arc energy than with a simple non-magnetic blow-out fusible cut-out. A comparison of arc characteristics to illustrate this point is given in fig. 1. If magnetic blow-out be adopted, it should be of simple and finite form; commercial forms, both for switches and fuses, are far from simple. The most reliable blow-out so far tested for heavy-current fusible cut-outs was obtained by bending the main leads at right angles for a few inches so that there was a tendency for the fuse element to be blown away from the ends of the conductors. In tests with currents ranging up to 100,000 amperes, portions of the fusible elements were blown 300 ft. away.

All fusible elements should be enclosed; many forms of enclosure at present in use are defective. When clearing any considerable amount of power there is a strong tendency for arcing to be set up to the metal housing and to adjacent poles, and no form of internal insulation so far tested has been found capable of preventing trouble of this nature. Fibre, bakelite, glass and similar enclosures are of poor mechanical strength, which is unfortunate, as their proximity to the point of rupture exposes them to high pressures. When rupturing a power of the order of 30,000 kVA per phase, pressures of the order of 1,000-2,000 lb. per sq. in. were measured approximately 1 inch from the point of rupture, and there is reason to believe that higher pressures are set up. The tests have not brought to light any liquid which reduces appreciably the pressure set up at the moment of rupture.

Enclosure in metal containers without damping substances has been found to be inadequate, chiefly because of the unrestricted range of the arc and the explosive effect which results in destruction of the carrier and arcing to the framework. When immersed in oil, the arc is restricted to a comparatively small space, but the pressures set up are not reduced. This necessitates a strong housing and the dimensions of the parts approximate to those usual for oil switches, which increases the cost, but results in apparatus having an intrinsically higher rupturing capacity than fuses of the insulated-container type. The increased rupturing capacity is obtained in a way that has so far proved to be a sound method of investing money in oil-immersed fuses or switchgear, namely, by the provision of mechanical strength. On a 6,000-volt three-phase pattern when rupturing approximately 50,000 kVA, pressures of the order of 600 lb. per sq. in. have been measured within 2 in. of the arc, and up to 200 lb. per sq. in. at the walls of the container.

Oxidation troubles are usually accentuated through the tendency of the filler to support the oxide film. Loosely packed filling avoids to some extent the holding-up action on the fusible element, but introduces a certain amount of oxygen and consequently increases the risk of explosion. A tightly packed filling, although practically eliminating oxygen, supports the fusible element and the oxide film and the molten material of the fusible element is prevented from being driven into the filler to be cooled. Good filling for cartridge fuses can be formed by using a calcium-carbonate base; also it is an effective arc damper, but it is possible for it to assist rather than quell the disruptive agencies; the introduction of a restrainer controls the action. Excellent results have been obtained with simple inert fillers, such as sand, but the gas pressures set up are likely to be higher with a filler of this sort than with fillers of the controlled type.

Fibre has been largely used for tubular fuse containers, but the common forms are not strong enough to withstand the pressure set up, and, furthermore, it is hygroscopic. Porcelain is perhaps better than glass mechanically, and the chief troubles with Bakelite are the non-uniformity of batches, conductivity along the laminæ, and, perhaps, the price. Special bakelised fibre has been found to give the best all-round results. The fixing of the end-caps in cartirdge fuses is an important matter.

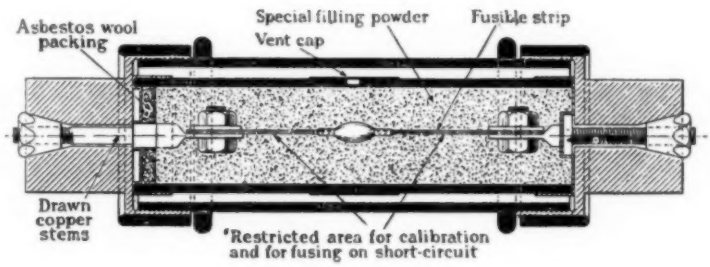


Fig. 2.—Section of Filled Cartridge Fuse.

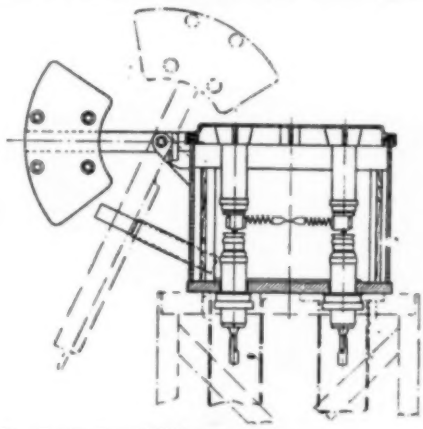


Fig. 3.—Section of Oil-immersed Fuse.

Rupturing Capacity Tests.—A piece of wire stretched between terminals in the open air could be regarded as superior to confining the wire in a carrier. Furthermore, it is a legitimate criticism to object to the carrier on other grounds, *i.e.*, it is usually formed of a comparatively fragile substance which is liable to splinter into dangerous fragments. A piece of fuse wire between terminals will clear short-circuits every time if the gap is large enough. On 6,000 volts a 24-in. gap gives moderate results, the important thing, however, is that the process of rupturing is not materially different from any of the undamped forms of fusible cut-out. Precisely the same experiences were obtained on and below 440 volts; a tremendous destructive explosion took place.

Consider, then, this simple arrangement with a correspondingly shortened break connected to a source of power capable of giving a short-circuit power of the order of 50,000 kVA at 440 volts, a likely condition, as was pointed out in an earlier section of this paper. Some engineers would put the same wire into a porcelain, or other, carrier (an addition of questionable merit) and would then consider, for some obscure reason, that conditions were entirely different. Others would go to the trouble of specifying the dimensions of the carrier, the confining case, size of the contacts and other factors which, from the rupturing-capacity point of view, are irrelevant, whilst neglecting the fundamental insecurity of the arrangement.

The problem must be attacked in a more logical way; let us seek the prime cause of the trouble. The rupturing of the circuit produces a certain amount of thermal energy at the arc, generated in an explosive manner, and the immediate result is the production of an arc and the unnecessary explosion of a quantity of vapour. The proper way to tackle the problem would be to reduce, first, the arc energy, and, secondly, to control the explosive effect; efforts to do this with simple fusing arrangements have met with no material result. The performance of a simple power fuse is described in some detail

in the paper in an attempt to present a picture of the performance of the majority of power cut-outs of this type. The tests were a reproduction of the conditions obtaining with the auxiliary supply in a modern power station, and were similar to the conditions to be found to-day on many a.c. distribution systems.

A three-phase transformer bank consisting of two 1,200-kVA transformers in parallel was coupled to a 6,000-kVA, three-phase, 6,600-volt turbo-alternator capable of giving a maximum of 70,000 kVA on dead short-circuit, and the results were disastrous, there being a huge flash and report accompanied by flying fragments, and it is almost certain that any person or apparatus in the neighbourhood would have been badly damaged.

In subsequent tests the fuses operated with the usual intolerable explosion, with flame and burning fragments ejected in all directions, but cleared the fault, and serve to show that open fuses, however, carefully designed, are inadequate on heavy-duty work and are dangerous alike to the operators and to all apparatus associated with them. Similar tests were carried out on many commercial tubular fuses with liquid, powder, and other fillings, and for various voltages. In the majority of the tests the fuses were totally destroyed, resulting in an open arc and explosion between the main contacts. A representative selection of these tests are described in the paper. Similar tests were carried out on many types of powder filled cartridge fuses, several variations of a modern design of filled cartridge fuse (fig. 2) and an iron-clad oil-immersed fuse of modern design (fig. 3).

Modern, filled, cartridge fuses put up an entirely different performance from the old pattern referred to above. Low-voltage, heavy-current, and high-pressure fusible cut-outs (up to 6,000 volts) were tested with equally good results. One design is that of a robust cartridge fuse with a bakelised fibre container and strong metal ends. For extra heavy duty, a double container is used with a venting arrangement between the inner and outer containers. The vent is quite effective;

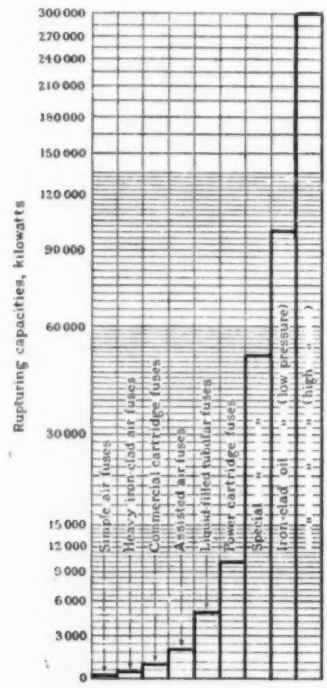


Fig. 4.—Breaking Capacity Chart.

a thin paper seal across a hole of pre-determined dimensions is used. The filling has calcium carbonate as a basis, and in similar tests to those which resulted in the destruction of the plain air and tubular cut-outs, the present one cleared satisfactorily with no sign of flash or flame and no report. It was perfectly safe to be in the vicinity when this cut-out was opening a potential short-circuit of the order of 100,000 amperes.

Another fusible cut-out tested had a single moulded container reinforced with metal bands and a simple inert filler of clean sand. It is capable of standing up to short-circuits of considerable magnitude and at voltages up to 440 and has operated satisfactorily up to 1,500 volts unaccompanied by any noise or flame.

A fourth type was the 600-volt, three-phase, 200-ampere iron-clad pattern with oil-immersed elements. The three phases were mounted within 2 in. of one another and within similar distance of an earthed iron case, yet this fuse broke short-circuits similar to those which destroyed the other fuses, without any sign of operation other than the ejection of a slight spray of oil through a somewhat faulty flange, and at no time was there any dangerous symptom.

As the result of these investigations, a curve has been prepared to assess the rupturing capacity of fuses of various types, fig. 4, and the information has been obtained largely by test. Column 9 (high-pressure oil cut-outs) has been extended to 30,000 kVA on the evidence of the performance of oil circuit-breakers similar in dimensions to these oil-immersed cut-outs.

(To be concluded.)

Discussion in London.

Mr. R. W. Gregory commenced the discussion by characterising the paper as a very valuable one which indicated persistent research. A proper fuse which cleared the short-circuit in the first half-cycle produced the least shock and damage to the plant and itself, in contrast with circuit breakers. High-speed circuit breakers, which had become the fashion in traction stations, were relied upon by the designers of the rotary converters to protect their machines, and they would not guarantee a rotary unless it was provided with such a breaker. The devices described by the author could really be called high-speed breakers for a.c. work, and his industrial type designs would be found very useful. He (the speaker) had attended too many inquests on fuses not to appreciate the value of the author's work, and it was satisfactory to learn how to replace the old dangerous and inadequate types, and to know that oil-immersed and powder-filled fuses were obtainable for modern requirements. High-pressure fuses were a revival and the paper recorded a very great advance in the art of protective gear. There was, however, a lack of knowledge on the subject of sequence discrimination.

Mr. P. D. Morgan pointed out that the paper represented very many tests carried out over a long period, and it clearly indicated that the prevalent idea that fusible cut-outs could not be relied upon for heavy duty was erroneous. Certain terms that the author had used to denote some things in his paper differed from the terms used by the B.E.S.A. and Research Association, an unimportant point perhaps, but it had been known to be the cause of serious misunderstanding. A nomenclature list was at present under consideration by the B.E.S.A. and Research Association, together with the factors which influenced deterioration; much interesting information had been collected and was being embodied in a report on the subject. The author's oil-immersed cut-out tests had been made with a.c. only and it was doubtful whether low-voltage d.c. tests would have produced similar results; a comparison should have been made. The Research Association had recently obtained the use of a large battery of accumulators at the L.M. & S. Railway's Stonebridge Park electricity generating station and it would be used for a series of d.c. tests on fusible cut-outs.

Mr. H. W. Clothier described the paper as a herculean work which would have done credit to a research committee, but the author had not needed anything like so long a time as the former would have done to produce results. He was glad to hear that facilities had been made available for carrying out corresponding d.c. tests. With reference to nomenclature, he remarked that the tests described in the paper had created a new term, *i.e.*, " potential short circuit," which meant that the amount of power plant behind the fuse was taken into account, but the choice of the word " potential " was unhappy because it would be apt to be confused with voltage. In discussing the rating of a fuse, he thought the author too optimistic when he spoke of a fusing current/load-current ratio of 1.2 to 1, which had been obtained from experiments with the fuse illustrated in fig. 2; the functioning of that device would really depend on the heat conducted from the restricted portions of the drawn-copper stems to the fusible strip, and the time factor of heat transmission from the copper to the central bulb was the controlling factor. He was glad the author had made such good use of the metal-clad feature, and his work would have a beneficial influence on the supply of power in rural areas.

Mr. A. Hooker, who said he was speaking on behalf of the student members, was of the opinion that there was a considerable field of usefulness for fusible cut-outs in rural h.p. work. It was high time the subject was given the attention it deserved in the college curriculum, where it had not hitherto featured. It was desirable to make the fuse container transparent, if only for inspection purposes, and in that connection silica might be of use.

Capt. P. Dunsheath said the paper would have been improved if the author had recorded the conclusions he reached as he proceeded; he had apparently assumed that readers had studied the subject as much as he had. The one-minute fusing current had not been dealt with, which was a rather serious omission, and another most important point had been overlooked. In the construction of fuses, restriction of the expansion of the gases which formed in the container when the fuse blew had been accidental and was deplored rather than made use of. In a new pattern of fuse which he had constructed, the fusible element was enclosed in a fibre tube (little bigger than the wire itself) that was strong enough to withstand the pressure generated when the fuse operated, which pressure damped the arc and reduced the violence of the explosion. Such fuses had consistently ruptured from 1,500 to 2,000 kW, d.c., at 250 volts, and were four times as good as other types of cartridge fuse of similar dimensions. Engineers should be capable of designing fuse enclosures which would stand pressures up to one ton per sq. in.

Mr. V. Hope referred to the performance figures of " Aeroflex " fuses, remarking that they had from two to three times the carrying capacity of other patterns. He pointed out the large space required for the accommodation of limiting resist-

ances, and said that surely such devices were not necessary if the fuse was made to do its best. With regard to oil-immersed fuses, he was prejudiced somewhat, but the liquid was the wrong one to use for it aggravated matters by creating gases itself and so increasing the pressure generated. However, no one had yet discovered a better liquid to perform the required function.

Mr. H. BRAZIL remarked that the new fuse Capt. Dunsheath had exhibited seemed almost too good to be true. He personally used a combined pressure and oil-immersed type; the glass containers had had to be strengthened, however, and springs were added to hasten the oil immersion. Regarding cartridge fuses, a type filled with marble dust and containing several silver wires had been successful.

The author (Mr. L. C. GRANT), in reply to the debate, intimated that he would deal fully with the various points that had been raised in the I.E.E. *Journal*. It was not advocated that from 10 to 20 per cent. more should be paid for a good fuse, but for one that operated in an entirely different manner (for small powers). Rupturing capacity was fundamental and was the first aspect to be tackled; others (such as rating, in connection with which much remained to be done) had only been introduced where they could not be avoided; regarding omissions from the paper, his difficulty was to keep it within reasonable length. Silica had been considered, but it was very similar to glass in so far as shock, &c., was concerned. Mr. Hope's fuse was known to operate very well.

The president (Mr. R. A. CHATTOCK), in calling for a vote of thanks to the author, said his paper was specially interesting just now when all engineers were trying to cheapen switchgear.

Induced-Current Cooking.

The New "Falkirk" Electric Cooking Apparatus.

As we mentioned in our issue of March 19th, the FALKIRK IRON CO., LTD., has recently introduced a range of electric cooking and water-heating apparatus depending for its functions on the principle of induced electric currents. The feature of the

Fig. 1.—15-kW Inducer Apparatus.

equipment is a transformer or inducer, the core of which is built up of laminated plates in the usual way, securely clamped together. A portion of the core is removable, thus breaking the magnetic circuit, this being necessary to link the cooking utensil or secondary circuit. For this purpose the foot of the utensil is arranged as a loop or one-turn coil of heavy nickelled copper, specially constructed utensils of course being necessary. The primary coils are securely fitted in place, and are

Fig. 2.—Domestic Suite and Separate Inducers.

of enamelled copper strip, bakelised after winding, and are connected in series or parallel to the control switches according to the supply voltage and the heat required.

In the case of single portable models, an outer casing and cover conceal and protect the primary circuit and main terminals, the casing being suitably earthed. The movable portion of the inducer, or keeper, is supported at the back on a suitable standard with springs which hold it above the transformer when the utensil is off, and allow it to close the core when pan is on. The exposed parts of the inducer are covered with a bright polished metal which does not tarnish, and at the demonstrations milk and fat were allowed to boil over on to these parts without harming them in any way. A special automatic switch is fitted to these models to prevent the keeper from being pulled down magnetically if the switch is closed when vessel is off.

The domestic oven, of which only a first model is available for inspection at present, employs induced current for roasting only, ordinary radiant-heat elements being used for other cooking. It is strongly constructed of steel and suitably lagged all round. The resistance elements are built in suitable frames which can be placed at the top, sides, or bottom of the oven as required, pin and socket contacts being employed. The elements are wired for multi-heat regulation and the cooking space may be limited by placing a horizontal element-containing shelf at any required height in the oven, the side or top elements being arranged accordingly.

The induced current for roasting is conveyed to and from the joint by means of special contacts; a steel plate laid in the bottom of the meat pan, and on which the meat rests, forms one of these, and a chain mesh which is laid over the meat forms the other. It is necessary to have lean cuts on the meat for both the top and bottom contacts. It is claimed that the chain is easily kept clean by plunging it into hot water and soda and drying it in an oven. The inducer for roasting is placed externally to the oven and the current is derived from a pair of coils wound so that when the domestic inducer is being used for oven work, it practically becomes an auto-transformer. The keeper is pressed into position and current switched on "high"; a small lever is then raised which acts as a switch for the oven coils and also prevents a pan from being placed in position on the inducer. The oven is used in connection with the domestic suite, fig. 2, which consists of one 3.7-kW and two 2.75-kW inducers and the oven, about 5½ kW, and the larger inducer is equipped for the oven cooking.

For heavy appliances for use in restaurants, hotels or ships, the boiling tables would consist of heavy inducers, 15 kW, fig. 1, let in flush with the table and built up in batteries to suit requirements. Large boiling pans of 20-25 gal. capacity, fish fryers, and water boilers, are equipped with the 15-kW units fixed permanently in the base of the apparatus. In the case of the water boilers part of the induced-current circuit is in the form of a tube through which the water in the tank circulates.

A Hyper-Super Station.—A recent note upon developments at St. Helens was given the heading "32,000,000 Kilowatt Power House" by the *Liverpool Express*. If this became the "selected station" under the Government scheme, it would produce quite enough for the Central Board to deal with.

The Electricity Supply Bill.

Some Comments on the Scheme.

At the annual meeting of the Salt Union, Ltd., on March 23rd, the chairman, Mr. Geo. H. Cox, said there was no subject about which more nonsense had been disseminated of late than that connected with the cost of production and distribution of electricity. The general public might consequently have been misled as to what was practicable. It was significant that the chairmen of several important electrical undertakings had recently expressed themselves strongly concerning the harm that might be done by well-meant Government interference, even if the administration was conducted through a statutory Board. The painful experience of the Mersey Power Company entirely confirmed this, as its progress during the last few years had been tremendously hampered. The Electricity Bill was calculated to create endless trouble and to fasten the dead hand of bureaucracy upon the industry, thereby crushing enterprise and progress. As drafted, it might be used to treat unfairly the existing up-to-date producers and undertakers. This would bear very hardly, for example, on such a concern as the Mersey Power Company, which, after a long and desperate struggle (not altogether unconnected with matters of control) was now within sight of reaping the fruits of its uphill task. Several stations had been equally successful and if let alone the efficient undertakings would quickly fill all the requirements of the country. He agreed with those who regarded the threatened legislation as quite uncalled for, and they would take every available and proper means to get the objectionable clauses of the Bill drastically amended. He did not object to reasonable public control when monopolies were granted such as the sole right to supply certain areas, but this was safeguarded by existing statutes. He also realised that the general interests would be served by the standardisation of frequency as proposed, while the fact that the Bill sought to make electricity much more widely used by means of greatly extended transmission cables was admirable. The estimated sales of current by the Mersey Power Co. this year would be appreciably increased owing to the demand of Crewe, Northwich, &c. New machinery was being installed to enable them to double their output; already they were selling at the rate of over a million units per week.

Mr. H. E. Parkes, president of the Birmingham Chamber of Commerce, in his address at the annual meeting last week, referred to the Electricity Bill. It would, he said, take a good deal to convince manufacturers that the advantage of changing from one periodicity to the other would be worth the enormous expenditure that it would throw upon everyone concerned. It would have been wiser had the Government put a skeleton Bill up for discussion and negotiation before it put a definite Bill before the House of Commons to which it as a Government was committed.

A statement issued on behalf of the Provincial Electric Supply Committee of the United Kingdom, representing practically all provincial electric supply companies, says that the declared object of the Bill is to enable electricity to be generated more cheaply than it is at present, but cheaper generation will not necessarily mean cheaper supplies if it involves, as appears to be inevitable, heavy capital charges, expensive transmission, and costly administration. The fulfilment of the scheme will occupy many years, and the immediate effect is likely to be disadvantageous to electricity users.

The anticipated beneficial results from the Central Electricity Board are based upon a large expansion of the use of electricity. If, after the expenditure of the large sum of money proposed, the increased output is not obtained within a reasonable time, the burden of the interest charges on that sum, with the addition of the administration charges of the Central Electricity Board, will seriously increase the cost of electricity.

The Committee is of the opinion that the Bill, in its present form, will not produce the results which are anticipated. It imposes greater disabilities and restrictions on existing undertakers. Cheap electricity in bulk can be better ensured by giving wider power and relief from existing disabilities and restrictions.

The Committee is of the opinion that it is not in the interest of the technical development of the generation of electricity that this work should be concentrated in the hands of a very limited number of individuals Concentration in too few hands eliminates that competition of ideas on which progress so largely depends, and tends to stereotype existing methods. This would ultimately react on the efficiency of electricity supply in this country.

The experience of electricity supply companies is that the principal causes at present preventing more rapid development in their areas are:—(a) Uncertainty of tenure; (b) Uncertainty of the price to be paid under compulsory purchase. The Bill does not remove these difficulties.

The Bill is drastic in character, and unless materially altered in Committee is in the highest degree detrimental to the industry.

Electricity is the key of the nation's industries. The Government's Bill, in its present form, fetters private enterprise, and must lead to confusion and higher costs. It is a step in the direction of complete State control of a great key industry and will facilitate the Socialist Party's avowed intention of nationalisation.

In the course of a circular addressed to the shareholders in the Yorkshire Electric Power Company, the Chairman, Mr. Arthur G. Lupton, states that the Power Companies were entrusted with the business of supplying in bulk to authorised distributors, and in face of great difficulties and despite many restrictions placed on them as a result of municipal opposition, they have, by the energy and initiative of private enterprise, built up large undertakings. They supply electricity in some of the most important industrial areas of the country, and their combined sales of electricity amount approximately to one quarter of the total sold by all the authorised undertakers in the country. The average price of the electricity sold by the Power Companies last year was less than one penny per unit. The Government's proposals will involve a serious interference with private enterprise, and a great and needless expense at a time when the burdens of national and local taxation are already becoming intolerable. The establishment of the Central Electricity Board will place the control of generation under a body of persons not directly responsible to Parliament and against whose decisions there is, in many matters, no effective means of appeal. Many thousands of investors have put their savings into electric Power Companies' shares. This Bill, if confirmed, will greatly reduce the market value of these securities, and render it impossible to secure further capital at anything approximating to the same favourable rates. The shareholders of the Yorkshire Electric Power Company have invested over 3¾ millions of capital in the belief that powers conferred by Parliament would not be interfered with; it will be a grave disaster if this faith in Parliamentary obligations is destroyed.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

The Electricity Bill and Broadcasting.—On March 22nd, Mr. G. Balfour asked the Prime Minister whether his attention had been called to a speech on March 19th, and broadcast by the British Broadcasting Company, describing the Government's electricity proposals as "Socialism in small doses"; whether he was further aware that on the same occasion the Chief Electricity Commissioner, Sir John Snell, in a speech delivered by him and broadcast, advocated the Government proposals; and what action he proposed to take.

Mr. Baldwin said that permission was given for broadcasting the speeches on the usual understanding that the speakers would refrain from controversial statements of a political character. As regarded Sir John Snell, he was informed that he gave a review of the electrical position in this country, and stated his view as to the line of technical improvement desirable. His only reference to politics was a mention of the Bill now before Parliament. He asked the electrical experts present to give constructive criticism.

The Cost of Standardising Frequency.—On March 22nd, Mr. Raine asked the Minister of Transport whether he had consulted any experts with regard to the cost of converting all the electrical plant in the country from 25 periods to 50 periods; and whether any estimate was available as to the probable cost of such conversion.

Colonel Ashley said that a report was prepared by Messrs. Merz & McLellan, the eminent consulting engineers. The results were given in the report of the committee under the chairmanship of Lord Weir.

On the same day Mr. Preston asked the Minister of Transport, if he would authorise the publication of the Merz Report, submitted to the Electricity Commissioners in respect of the standardisation of frequency in Great Britain.

Colonel Ashley said that the conclusions as to the cost of standardisation of frequency proposed by Messrs. Merz and McLellan were given in paragraph 88 of the report of the committee under the chairmanship of Lord Weir. He did not propose to publish the whole report.

Long-Distance Transmission.—On March 22nd, Major Ainsworth asked the Minister of Transport whether, in view of the introduction of the Electricity (Supply) Bill, he proposed to investigate, from the point of view of cost, the conditions of transmission of power over long distances.

Colonel Ashley said that the question of the cost of the transmission of power over long distances entered into, and constituted a part of, the investigation made by the Chairman of the Electricity Commissioners in preparing the memorandum appended to the report of Lord Weir's Committee.

Smoke Abatement.—On March 23rd, in the House of Lords, Lord Gage, in moving the second reading of the Public Health (Smoke Abatement) Bill, said that the first clause of the measure made it possible to take proceedings in respect of smoke nuisances, irrespective of the colour of the smoke. It extended the exemption from legal proceedings to certain premises, chiefly connected with the steel trade, and enabled the Minister of Health, subject to confirmation by Parliament, to exempt other premises. Clause 2 enabled local authorities to set up standards of smoke emission, subject to confirmation by the Minister. Clause 4 enabled local authorities to require that certain new buildings should be provided with arrangements for smokeless heating. While it was obviously impossible to require the alteration of heating arrangements in existing buildings, the Minister considered that it should be possible to enforce smokeless heating arrangements in new buildings. It was considered that the extension of the provisions of the Bill to dwelling-houses would not be compat-

ible with the rapid and inexpensive provision of working-class houses.

The Bill was read a second time.

Municipal Electrical Service.—Elsewhere in this issue we continue the report of the proceedings of the Committee upon the Colwyn Bay Bill, and also deal with the Committee stage of the Doncaster Corporation Bill. The Guildford Corporation Bill was read a second time on March 24th, and, later, Mr. Campbell moved · " That it be an instruction to the Committee on the Bill that they shall leave out Clauses 52 and 53." He said that Clause 52 empowered the Corporation to sell electrical fittings, and Clause 53 sought to confer powers for the establishment of showrooms. It was said, in support of these clauses, that 70 or 80 municipal authorities already possessed those powers, but having been a trader and a merchant all his life, he was opposed to municipal trading.

Sir HARRY FOSTER, who seconded, suggested that before the business of private electrical firms and contractors in this country, employing capital which was estimated to amount to about £3,000,000, was subjected to unfair, rate-aided competition, the matter should be inquired into by a Joint Committee of both Houses.

Sir H. BUCKINGHAM, the Unionist member for Guildford, in opposing the instruction, thought that the House had been led away entirely on the question of municipal trading. The present question was not one of municipal trading at all, but purely a matter of business, and if the clauses in question were passed it would mean good business for Guildford. In these modern days all those small houses ought to be wired and equipped with electricity, but in many cases the occupiers or owners were not able to put down the necessary capital for the installation, except on the deferred payment system, and local contractors would not, as a rule, put in electrical installations on such terms.

Mr. ATTLEE, who also opposed the instruction, said that up to a short time ago Guildford's electricity was supplied by a company. The result was that there were a number of breakdowns, no dividends were paid, and the company did not reduce the price of electricity. The town had now taken over the business, with the result that it now paid its way, there had been no more breakdowns, and the cost of electricity had been reduced from 11d. to 7½d. per kWh.

After further discussion, the motion for the instruction was rejected.

Post Office Tube Railway.—On March 23rd, Mr. BROAD asked as to the present position of the Post Office (London) Tube Railway.

Lord WOLMER, Assistant Postmaster-General, said that the permanent way had been completed; the bulk of the electrical plant had been manufactured and its installation was proceeding rapidly. It was anticipated that the railway would be available for traffic in the autumn. The sum provided under the Post Office (London) Railway Act, 1913, was £1,100,000; the sum expended to date was £1,411,000.

The Electricity Bill.—On March 29th, Col. ASHLEY, the Minister of Transport, moved the second reading of the Electricity (Supply) Bill in the House of Commons.

Before the debate began Mr. D. HERBERT, who had on the Order Paper a motion to reject the Bill, submitted that the motion for the second reading could not be proceeded with until the measure had been referred to the Examiners for report as to whether it affected private rights.

The SPEAKER said that he had examined the Bill carefully, and had come to the conclusion that it need not be submitted to the Examiners.

Col. ASHLEY said that this country was unfortunately behind many others in electrical development. There were in this country 592 public utility stations, of which 494 belonged to authorised undertakers, many very small. Thirty-two were responsible for 50 per cent. of the total output, while 462 between them were required to generate the other 50 per cent. That was wrong. Experts told him that the question of load factor was the crux of the whole matter. The average load factor was no higher than 25 per cent., which meant that only one-quarter of the plant was working at full capacity. To improve this load factor was really the great object of the Bill and should be the object of all electrical reform. Only one-third of Great Britain was reasonably supplied with electricity. Practically all the rest was supplied by small undertakings, incapable of generating electricity except at an unreasonably high cost. The Bill aimed at levelling up the efficiency of generating stations. The present yearly consumption of electricity per head of the population was only 118 units, as compared with Italy 140, France and Germany 200, Belgium 230, Norway and Sweden 500, U.S.A. 500, Switzerland 700, Canada 900. How could we hold our own in trade while we consumed only half the units per head of population that Belgium did? Some reorganisation was absolutely necessary. There was no fear that if we reorganised our plant we could not produce power as cheaply as our commercial competitors. We must foster the development of mass production by means of large generating units in big interconnected stations. Cheapness was largely a matter of big generating stations. Cheaper electricity would enable more efficient modern machinery to be installed for commercial purposes. It was doubtful whether we had more than 34 per cent. of our industrial equipment engaged in production operated by electricity. It was estimated that in 15 years the annual consumption per head of population in this country should increase to 500 units. If the Bill became law it was estimated that by 1940 the saving to the consuming public would have reached £44,000,000 per year over and above the normal economies which might have been effected if the Bill had not been introduced. They were also pathetically behind other countries in labour-saving devices for housewives. In America 1,000,000 curling irons were operated by electricity and housewives had learned to be happy though servantless. The Bill would also help agriculture.

The Bill rightly emphasised the distinction to be drawn between distribution and generation. Distribution was left in the hands of existing authorities. The Bill maintained the principle of separate authorities with all the stimulus of local management. With regard to generation the Government had no desire to interfere with ownership and management more than was necessary. The sole function of the Central Electricity Board would be co-ordination; it would be essentially an organising body. It would be a commercial concern, and its commercial discretion would be absolutely unfettered. It would not be a Government Department in any sense of the word. The Board would be appointed by the Minister. If there was to be interconnection there must be standardisation of frequency. The extent to which this might be necessary and the time for doing it were left by the Bill to the Board. Under Clause 9 the Board was given power to require standardisation on the understanding that it must bear the whole expenditure, including the cost of altering or replacing the plant of the consumer. The Weir Committee recommended that the cost of standardisation should be met out of State funds and suggested that this expenditure might be repaid, without interest, through the operation of the Board. The Government, however, did not feel justified in putting this burden upon the taxpayer, and after it had gone very closely into the figures it decided that the whole expense should be met by the Board and could be so met without detriment to the scheme, and accordingly the cost was made a capital charge of the Board.

Turning to the finances of the Board and remembering that real economy consisted in a judicious expenditure of money, the Weir Committee decided that the capital required under the scheme would be £25,000,000 and that this sum should be guaranteed as to principal and interest. That estimate had been accepted and when to that had been added the cost of standardisation it would be found that the capital authorised under the Bill stood at £33,500,000 sterling. The primary object of the Bill was to reduce the price of electricity; accordingly provisions were inserted to ensure that any saving in generation should be passed on to the consumer.

Sir J. MARRIOTT asked whether £33,500,000 would be sufficient to cover the acquisition of those stations which were to be shut down?

Col. ASHLEY said he could not tell how many cases there might be. He could not imagine that there would be many of them.

He asked the House no longer to approach this great question from a parochial point of view, but to use some imagination and faith with regard to it. He could not conceive that this Bill would hurt the gas industry in any way whatever. Such a scheme had never done so in America and in other places, where these two industries were working side by side and sometimes hand in hand. The prosperity of the one had meant the prosperity of the other. He appealed to all the power companies and the municipal authorities which operated and owned electricity stations. They were not asked to give up the ownership of their stations; they were not asked to give up the ordinary management of their stations; but what they were asked to do was to submit to a co-ordinative control as to the hours they should work, what peak load they should put into operation and generally to assent to a general co-ordination all over the country. How could that hurt them at all? They stood to gain substantially in three ways. The whole of their output was guaranteed to be taken. Their stock in his judgment would become gilt-edged and more valuable than it was at present. They would sell a greater number of units under the scheme, and would secure a greater saving per unit than they did before. Their sale of electrical apparatus, such as cookers, &c., would be increased and generally they would do much more business than they were doing at present.

Mr. D. HERBERT: The Minister says that these companies would have a guarantee that all their output would be taken?

Col. ASHLEY: Yes, certainly. The way they are to generate is to be laid down and the whole of their output is to be taken by the Board.

Mr. D. HERBERT: By the Board which decides how much they are to generate?

Col. ASHLEY: Certainly. Proceeding, the Minister also appealed to the owners of the stations which might have to shut down. He knew, he said, that no one liked to have his own pet station and his own pet business done away with, but distribution would remain. It was only generation in small stations which was to be done away with and if one could get something cheaper than one was now making it, then surely it was no great hardship to anyone. In the Bill the Government had endeavoured to carry out the principles in which it believed—that it was not the business of the Government to manage or operate, but to co-ordinate and to control. The State should leave to agencies, private companies, or public authorities those operations which they could carry out themselves. No Parliament working through a bureaucracy could have achieved the progress or made the discoveries in the electrical industry which had emerged in recent years. But the Government could regulate—and rightly regulate—public utilities.

Mr. W. GRAHAM, on behalf of the Labour Party, moved:—" That this House, considering that the urgent need of the nation for a cheap and abundant supply of electricity can best be secured by the development of a publicly owned and controlled system of generation, main transmission, and distribution, cannot agree to the second reading of a Bill which fails

to provide for the co-ordination of the production of coal and its by-products with electrical generation, creates cumbrous machinery, strengthens and extends the hold of profit-making companies over an indispensable public service, continues the limitation of municipal undertakings in confined and uneconomical areas of distribution, and affords to consumers in company areas no adequate protection against excessive charges for light and power." He explained that the Labour Party advocated a solution of the whole question on the principle of public ownership by the State. The Government had been driven to their present proposals by economic forces beyond their control. Administratively the Bill exceeded the worst complication that any member of the Socialist Party could devise, while financially it was rotten.

Mr. D. Herbert, a Unionist, declared that the measure did not place the industry under the control of the Government, but under the control of an autocratic Board, the members of which were appointed not by Parliament but by the Minister of Transport. The entire generation of electricity was to become an absolute monopoly of the Board. The Government had brought forward a thoroughly impracticable scheme, the failure of which would put the industry back for 10 or 25 years.

Mr. P. Harbis, a Liberal, supported the Bill.

Mr. R. S. Hudson believed that under the Bill the cheapening of the supply of electricity would make the demand so large that the last possible excuse for nationalisation would be cut away.

Sir C. Wilson declared that the Government were seeking to impose an unjustifiable tyranny on the great municipalities.

Mr. Hardie, a Labour member, objected to the payment of £33,500,000 to wipe up the mess of private enterprise.

Mr. Burman, one of the Unionist members for Birmingham, urged the Government to give some right of appeal from the Central Board, so that the non-standard undertakings might know exactly where they stood, and to give them a certain amount of time to change over.

Mr. T. J. O'Connor, another Unionist, said that the Bill would not, as at present designed, produce cheap electricity. This view was also taken by other Unionists, among them being Mr. P. J. Hannon, who, as one directly interested in electrical undertakings, declared the measure to be impossible.

Major Kindersley based his objection to the Bill on financial grounds. The measure asked them to underwrite in advance a sum of £33,500,000 for an enterprise the details of which had not been examined by the three gentlemen whose report they were asked to accept blindly. If the Bill could not produce a scheme which would stand the scrutiny of the business community it should receive no guarantee from the taxpayer.

Mr. Grotrian said that if left to itself the electrical industry would accomplish everything that the Bill set out to do.

Lord Apsley, one of the few Unionist members who spoke in support of the Bill, believed that they were on the eve of a great enterprise.

Sir G. Hume, another Unionist, considered that without a measure of compulsion, it would be impossible to do anything from a national point of view. The country had made up its mind that something had to be done, and he had heard of no alternative to the Government proposals except the Socialist amendment. He would support the Bill, but he felt strongly that there must be a right of appeal.

Mr. T. Thomson, a Liberal, contended that if the Government had applied compulsory powers to existing legislation it would have achieved greater success than the present extraordinarily hotch-potch measure. There should be more control by Parliament than was provided for in the Bill.

Commander Burney urged that the Bill should provide for the standardisation of pressure as well as of frequency.

Mr. Clarry said that the gas industry would not oppose the Bill, but strongly resented the fact that there was no appeal from the decisions of the Electricity Commissioners.

Major Attlee (Labour) complained that the Bill did not provide for the control of distribution or of the prices charged, which should not be left in the hands of companies.

Lieut.-Col. Moore-Brabazon, Parliamentary Secretary to the Ministry of Transport, said that no one could maintain that the present position was satisfactory. Distribution was not touched by the Bill, but the cost of generation would be greatly reduced. If it were thought right to generate electricity at the pit mouth, or if low-temperature carbonisation became possible, the Bill put no obstacle in the way.

The debate was adjourned on the motion of Mr. G. Balfour.

(To be concluded.)

Trade-Mark Applications.

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be lodged within one month from March 24th :—

Sylva (lettering and design). No. 465,335. Class 8. Thermionic valves. No. 465,430. Class 13. Electric lamps (ordinary).—Julius Axelrad, 25, Mornington Crescent, N.W.1, and 14, Leopold Ernst Gasse, Vienna.

Tungstron (lettering and design). No. 465,336. Class 8. Apparatus for use in radio-telephony and telegraphy, but not including electric accumulators. No. 465,431. Class 13. Electric lamps (ordinary).—Julius Axelrad ((address as above).

A.C.C., Ltd. (lettering and design). No. 466,830. Class 8. Thermionic valves, electric lamps (philosophical), vacuum tubes, electric signs, X-ray tubes and apparatus, not for medical or surgical purposes, electric furnaces, &c.—A. C. Cossor, Ltd.

Correction.—The number and correct description of the trade mark applied for by the British Ebonite Co., Ltd. (*vide* our issue of March 19th), are 466,435 and "Becolate."

Published Specifications.

Compiled expressly for this journal by Patent Agents.
The name of the applicant's patent agent, if any, will be found on the printed specification.
The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1924.

21,289. "Electromagnetic acoustic devices." Standard Telephones & Cables, Ltd. (formerly Western Electric Co., Ltd.). (Western Electric Co., Inc.). September 9th, 1924. (248,412.)

26,527. "Electric transformers." S. Z. De Ferranti and Ferranti, Ltd. November 6th, 1924. (248,420.)

26,618. "Electric current controllers." Alloy Welding Processes, Ltd., and R. W. Happe. November 7th, 1924. (248,430.)

28,379. "Loud speakers." H. J. Round and J. G. Robb. November 26th, 1924. (Cognate applications 3,011/25 and 19,402/25.) (248,433.)

28,916. "Sockets for valves, coils, and the like of wireless instruments." T. B. Braid. December 2nd, 1924. (248,450.)

28,938. "Electrical switches." H. B. Stanton. December 3rd, 1924. (248,451.)

29,009. "Lamp-globe holders." J. Stone & Co., Ltd., and J. F. B. Vidal. December 3rd, 1924. (248,455.)

29,036. "Crystal rectifiers for wireless reception." R. G. McLeod and W. J. McLeod. December 3rd, 1924. (248,459.)

29,087. "Electric couplings." A. E. Chapman and C. R. Cook. December 4th, 1924. (248,464.)

29,103. "Transmission and reproduction of sound." J. T. Day. December 4th, 1924. (248,465.)

29,106. "Electrolytic condensers." Automatic Telephone Manufacturing Co., Ltd., and A. E. Hudd. December 4th, 1924. (248,466.)

29,143. "Variable inductances." M. E. Elliott. December 4th, 1924. (248,469.)

29,187. "Electric measuring instruments and relays." Crompton & Co., Ltd., W. G. Smith, and W. F. Jones. December 5th, 1924. (248,473.)

29,221. "Mounting of electron-discharge devices." N. P. Hinton and Metropolitan-Vickers Electrical Co., Ltd. December 5th, 1924. (248,474.)

29,512. "Variable electric condensers." H. V. Flinn. December 9th, 1924. (248,485.)

29,864. "Combined electric switches and electric couplings." J. A. Crabtree. December 12th, 1924. (Cognate applications 29,965/24 and 22,851/25.) (248,496.)

29,973. "Resistances, rheostats, potentiometers, inductances, and the like used for electrical purposes." A. E. Moore. Decembr 13th, 1924. (248,498.)

30,394. "Apparatus for electromagnetically engaging and disengaging claw couplings for shears, punches, presses, or the like." Deutsche Maschinenfabrik Akt. Ges. January 14th, 1924. (227,811.)

30,507. "Systems of electric motor control." British Thomson-Houston Co., Ltd., R. D. Given, W. J. Pool, and H. W. C. Liddiard. December 18th, 1924. (248,503.)

31,138. "Electric generator." J. W. Tyler. December 29th, 1924. (248,516.)

1925.

399. "Radio receiving apparatus." Sterling Telephone & Electric Co., Ltd., and W. M. Holbeach. January 6th, 1925. (248,522.)

887. "Supports for headphones used in wireless telephony and the like." M. Sutton. January 12th, 1925. (248,527.)

2,545. "Combined condenser and inductance-coil holder for wireless instruments." L. Manning and C. E. Needham & Bro., Ltd. January 29th, 1925. (Cognate application 23,940/25.) (248,535.)

4,890. "Expanding and contracting electric illuminated signs." C. G. White and A. Brooke-Irish. February 21st, 1925. (248,550.)

5,969. "Fine-adjustment devices for electrical instruments." A. R. Taylor. March 4th, 1925. (248,559.)

6,105. "Electric insulators." J. A. Brassington, jun. March 6th, 1925. (248,562.)

6,612. "Construction of tumbler switch." W. J. Charles. March 11th, 1925. (248,567.)

8,574. "Magneto-microphonic relays." C. F. Adolph. March 31st, 1925. (248,581.)

9,844. "Loud speakers." Dr. G. Seibt Fabrik Elektrischer und Mechanischer Apparate. June 16th, 1924. (235,529.)

10,048. "Automatic stopping devices for electric lifts." Smith, Major and Stevens, Ltd., and P. H. Stevens. April 17th, 1925. (248,588.)

10,243. "Leading-in tube combined with throw-over switch contacts and spark-gap for use with wireless or other electrical apparatus connected to overhead aerials." P. J. Ambrose. April 20th, 1925. (248,590.)

12,673. "Aerials for use with wireless receiving apparatus." J. W. Hyde. May 15th, 1925. (248,597.)

12,750. "Insulating blocks for electric heaters, resistances, and like apparatus." W. F. Jackson and G. Bray & Co., Ltd. May 15th, 1925. (248,598.)

14,214. "Electron-discharge valves." Compagnie Générale de Télégraphie Sans Fil. June 2nd, 1924. (234,844.)

14,455. "Telephone receiver rests." W. H. King. July 8th, 1925. (248,609.)

15,549. "Illuminated advertisement machine." E. A. Vardy. June 16th, 1925. (248,614.)

15,735. "Electric connectors." F. Kniveton. June 17th, 1925. (248,616.)

19,351. "Multi-filament incandescent lamp." S. Rendes. July 30th, 1925. (248,631.)

21,670. "Variable electric condenser." S. Cohen. August 29th, 1925. (248,647.)

21,940. "Speed-regulating device for electric elevators." Waygood-Otis, Ltd. June 18th, 1924. (Divided application on 235,858.) (239,515.)

22,028. "Electrodes for thermionic valves." A. Emerson, jun. September 3rd, 1925. (248,648.)

22,445. "Immovable electrolyte for dry cells." Compagnie Francaise pour l'Exploitation des Procédés Thomson-Houston. September 8th, 1924. (239,547.)

23,210. "Electron discharge devices." British Thomson-Houston Co., Ltd. September 17th, 1924. (240,166.)

24,500. "Electron discharge devices." British Thomson-Houston Co., Ltd. October 1st, 1924. (240,850.)

24,675. "Automatic reduction gear couplings for combined electric starters and dynamos for motor vehicles." P. Dufour. October 4th, 1924. (240,865.)

24,998. "Electrical condensers." Dubilier Condenser Co. (1925), Ltd. October 7th, 1924. (241,200.)

25,133. "Multiple or combination electric switches." A. H. Midgley and Auto Sundries, Ltd. October 8th, 1924. (248,661.)

25,248. "Electron discharge apparatus." British Thomson-Houston Co., Ltd. October 9th, 1924. (241,216.)

25,549. "Thermionic discharge devices." Westinghouse Electric & Manufacturing Co. October 14th, 1924. (241,556.)

26,698. "Arc-light high-frequency oscillation generators." C. Lorenz Akt. Ges. February 13th, 1925. (247,517.)

26,781. "Overload time-lag protective arrangements for electric circuits." J. W. Kirkland (Allgemeine Elektricitats Ges.). October 26th, 1925. (248,669.)

26,736. "Electric motor driven change-speed device." E. C. R. Marks (Hendey Machine Co.). October 26th, 1925. (Addition to 239,395.) (248,670.)

28,305. "Surface condensers." International General Electric Co., Inc. November 10th, 1924. (242,677.)

30,112. "Gas-filled electric lamps." General Electric Co., Ltd. March 18th, 1925. (248,680.)

32,757. "Movable headlights for vehicles." J. W. Reynolds. December 28th, 1925. (248,685.)

1926.

3,632. "Electric couplings." A. E. Chapman and C. R. Cook. December 4th, 1924. (Divided application on 248,464.) (248,692.)